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ANNIVERSARY 20TH
SEPTEMBER/OCTOBER 1999

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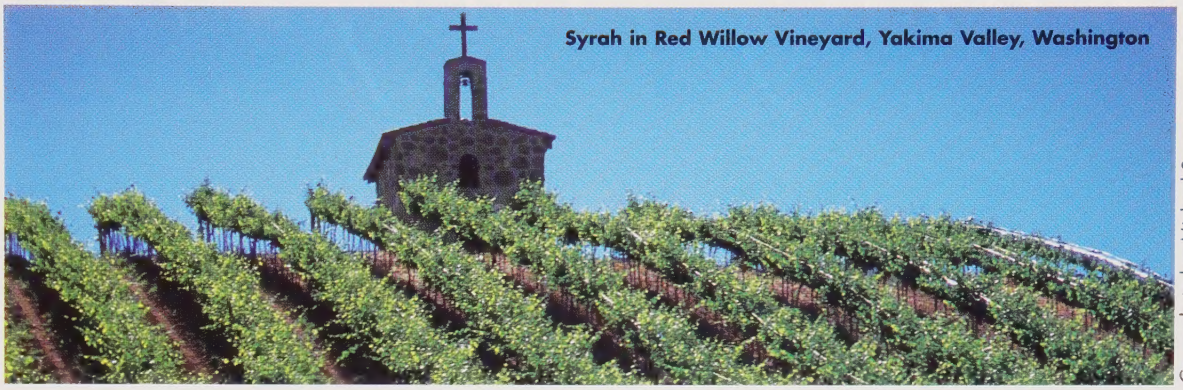

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Formula wines threaten integrity of varietal names

BY Ken Freeze

A consumer walks into a store looking for some wine to go with dinner. She looks at the Merlots, sees a wide variety of labels, and reaches for a California Merlot with Natural Flavors. Although she notices price differences between her selection and the dozen other Merlots on the shelf, there is nothing about the label to alert her that not all are made with at least 75% Merlot winegrapes.

When selecting wine, most Americans assume that the product in the container is clearly described on the label and that it contains 100% wine. After all, they believe that the government has strict regulations on product labeling to protect consumers from fraud. However, a ruling by the Bureau of Alcohol, Tobacco, & Firearms (ATF) in 1997 has opened the door for wine producers to use varietal names on "formulated" wine beverages.

Formulated wines are flavored wines made from a base of wine with added natural flavors. Each formula must be approved by the ATF. They may be made from heavy-bodied blending wine and juice or concentrated fruit juice to which wine spirits have been added. The added flavors could be herbs, spices, fruit juices, aromatics, or essences, plus caramel, sugar, and any other flavor as long as it's natural. The beverage may only be 50% wine, but as long as 75% of the wine it does contain is a specific varietal, that varietal can be named on the front label.

In addition, beverages that contain less than 7% alcohol are not governed by ATF rulings but by the Food & Drug Administration (FDA). Front labels on these products can claim that they are fine varietal wines as long as that wine is the largest ingredient by volume listed on the back label. In fact, they may contain very little wine, along with water, sweetener, and any number of other ingredients.

Are these new products perpetrating consumer fraud or simply taking advantage of shrewd marketing that may prompt new consumers to drink wine? Many in the industry believe these beverages are generating consumer confusion and undermining hard-won gains in consumer recognition of varietal wines.

The problem began in 1997 when an Almaden boxed wine product that had been 100% wine was converted to a formulated wine product with very little change in labeling. The front label that had read "California Chardonnay" became "California Chardonnay with Natural Flavors." Nowhere on the package are the contents otherwise described.

Though the formula for the new beverage was a proprietary secret, speculation was that the beverage contained about 50% wine (of which 75% must be Chardonnay) and, therefore, did not appear to fit the description of any of the nine existing possible categories of wines mandated by ATF, such as grape wine, sparkling wine, aperitif wine, or other-than-standard wine.

In these categories, current ATF regulations require wine-based beverage labels to carry a truthful and adequate statement of composition, but they do not have to list all ingredients. When ATF was asked for a ruling on the statement of composition for these formulated wine-specialty products, it ruled that "California Chardonnay with Natural Flavors" truthfully described the base wine used in the product. The producers were not required to identify the remaining beverage contents.

At the time, no one imagined what repercussions that simple ruling would have on America's wine industry, or what it would mean to consumers. As a result, consumers now find "Peach Chardonnay," "Blackberry Merlot," and "Strawberry White Zinfandel" on their local store shelves. Premium wine labels may soon have to state "real wine from real grapes" to distinguish true varietal wines from these products.

Coupled with other regulations, the ruling means that while one Merlot (or Chardonnay, Zinfandel, or any other varietal for that matter) must be made from at least 75% Merlot grapes, the Merlot right next to it on the shelf may have only 37.5% — or less — of the varietal named on the bottle. The only way a consumer could tell the difference between the two would be to recognize the meaning of the term "with natural flavors."

What concerns many in the wine industry most about these practices is the misuse of varietal names.

"For years the wine industry has been slowly educating consumers. As a result, Chardonnay, Zinfandel, Pinot Noir, and a host of other varietal names are now recognizable and associated with very specific products and quality," says Stephen Pessagno, vice president and winemaker for Lockwood Vineyard (San Lucas, CA) . "I have no problem with them using the word "wine" on the label, but the use of varietal names on these formula wines could unravel this work and set our wine industry back decades."

"These products exploit the value that the wine industry has built into varietal names," according to Karen Ross, president of the California Association of Winegrape Growers. "Winegrape growers view these as "replacement" products rather than new innovations. These formula wines use less grapes, and consumers grabbing for their usual

PRODUCT DESCRIPTIONS

Arbor Mist Peach Chardonnay
Alcohol 6% by volume, has screw top closure
FRONT LABEL: A fine wine product with delicious peach and other natural flavors.
BACK LABEL: Arbor Mist Peach Chardonnay is the refreshing new way to drink wine. Its combination of Chardonnay wine and luscious peach fruit flavors is the perfect beverage for casual get-togethers, festive celebrations, and relaxing at home.
Ingredients: Chardonnay, water, high fructose corn syrup, natural flavors, citric acid, carbon dioxide, potassium sorbate, potassium benzoate, and potassium metabisulfite (to preserve freshness).
Bottled by: Arbor Mist Winery, Canandaigua, NY 14424
Government warning appears on back label.

Wild Vines Peach Chardonnay
Alcohol 6% by volume, has screw top closure
FRONT LABEL: A fine wine product with delicious peach and other natural flavors.
BACK LABEL: Contains 0% juice: Chardonnay, carbonated water, dextrose, fructose, natural and artificial flavors, less than 1% of potassium sorbate to protect flavor, color added, sulfiting agents.
Bottled by: E&J Gallo Winery, Modesto, CA.
Refund: IOWA 5¢, Maine 15¢, California cash refund
Government warning appears on back label.

LYRICA Raspberry Merlot
Alcohol 6% by volume, has screw top closure
FRONT LABEL: Wine beverage with natural and artificial flavors.
Bottled by: LYRICA Vineyards, Westfield, NY 14787, Ripon, CA 95366.
BACK LABEL:
Ingredients: Merlot, carbonated water, high fructose corn syrup, citric acid, natural and artificial flavors, potassium sorbate, sodium benzoate and sulfur dioxide (to preserve freshness).
Refund: CT, DE, IA, MA, ME, NY, OR, VT 5¢, MI 10¢, CA cash refund

Almaden California Chardonnay with Natural Flavors
Alcohol 12.5% by volume, 750ml bottle has bar-top cork closure, also available in 5L bag-in-box
Vinted and bottled by: Almaden Vineyards, Madera, CA.
Comments: 800/726-9977
Government warning appears on back label of bottle and back of bag-in-box.
No other product information on package.

Almaden Cabernet Sauvignon with Natural flavors
Alcohol 12.5% by volume, available in 5L bag-in-box
Vinted and bottled by: Almaden Vineyards, Madera, CA.
Comments: 800/726-9977
Government warning on back of package.
No other product information on package.

Franzia Merlot with Natural Flavors
Alcohol 12.5% by volume, available in 5L bag-in-box
Government warning appears on back of box.
No other product information on package.

Chardonnay are highly unlikely to notice the 'with natural flavors' phrase or take the time to read the back label." [*Editor's note:* Replacement products supplant another product rather than adding to overall sales.]

If this trend is allowed to continue, consumers could be reaching for "Cabernet Sauvignon with Natural Flavors" believing they are getting their one glass of red wine a day when, in reality, they are sipping one glass of wine, water, sweetener, and grape alcohol. Price-conscious restaurants, heedless of the difference between varietal

U.S. RESEARCH SURVEY RESULTS

In 1998, in order to learn just how important labels are to wine consumers, California Association of Winegrape Growers commissioned Dennis Tootelian, PhD, professor of marketing and director of the Center for Small Business at California State University, Sacramento, to conduct a survey of wine consumers to discover what consumers expect on labels and how labels influence their buying decisions.

While a product's label can be a useful marketing tool, it also has the potential to confuse or mislead the potential buyer. This has been recognized at the federal level with the passage of various laws to regulate labeling, such as the Nutritional Labeling and Education Act of 1990.

Since it is generally agreed that product labels are an important marketing tool, several related issues become significant:

- What information do consumers want on a label?
- How credible do consumers consider label information to be?
- To what extent are consumers confused by what is printed on labels?
- How important to purchase decisions is selected information placed on labels?

Consumer desires for product label information, credibility of label statements, and the extent to which consumers are informed or misled by statements on labels were issues examined by Dr. Tootelian's study. Various wine labels and statements concerning product contents made on the packages were used as the basis of the study.

More than 800 wine consumers from

wines and the new formula wines, might offer only formula wines.

"Everyone in the wine industry agrees on the need to broaden the consumer base for wine — but is this the way to do it?" asks Randall Lange of Lange Twins Vineyards in Lodi, CA. "These formula wines are not innovations. They are merely product cannibalization."

"This issue hits at the very definition of wine, because these are not wines." says Tom Shelton, president of the Napa Valley Vintners Association. "The

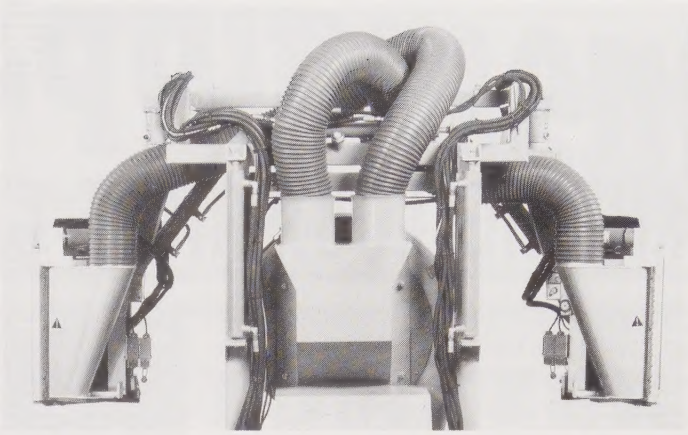
CONTINUED ON PAGE 69

all over the U.S., covering the full spectrum from "wine connoisseurs" to neophyte wine drinkers, were surveyed.

The study found:

- More than nine out of 10 respondents (92.2%) believed that wine labels accurately reflect what is in the container.
- More than eight out of 10 respondents (80.9%) considered label information important to their buying decisions.
- Nearly nine out of 10 (89%) were not aware that beverages containing wine, fruit flavoring, and other ingredients are on the market.
- Seven out of ten (70.4%) thought it would be misleading to call such products "wine."
- Nearly half of the respondents (48.2%) expected products bearing labels with disclosures, such as "California Cabernet Sauvignon with Natural Flavors" and "California Chardonnay with Natural Flavors," to be varietal wines containing at least 75% wine from grapes of the variety.

These results support the findings of the U.S. Research survey, which were that the current system of labeling wine specialty products misleads consumers. U.S. Research was hired by ATF to study labeling of boxed wines in 1998. Both studies were conducted before any of the less-than-7% alcohol products entered the market. In fact these two studies complement each other, because the U.S. Research survey examined what consumers do, while the Tootelian survey studied what consumers want. As a result, when used jointly, the surveys provide a good set of perspectives on the issue of wine product labeling.



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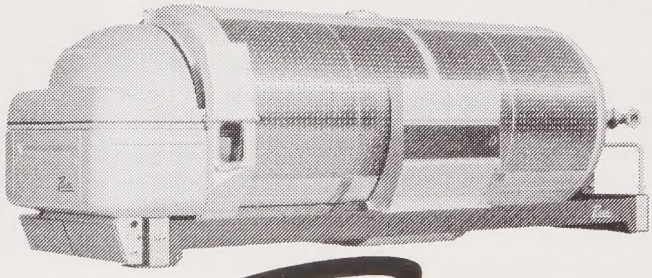

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OCTOBER 18 THROUGH 20

PACKAGING EQUIPMENT EXHIBITION

Looking for the latest in packaging equipment or labeling? Check out PACK EXPO Las Vegas 99 October 18 through 20, 1999, at the Sands Expo and Convention Center in Las Vegas, NV.

A trade show and seminars will focus on the latest developments and issues in packaging and will showcase exhibitors' state-of-the-art advances in packaging machinery, converting machinery, materials, packages and containers, and components.

PACK EXPO is sponsored and produced by the Packaging Machinery Manufacturers Institute (PMMI), a leading non-profit packaging association with 460 members.

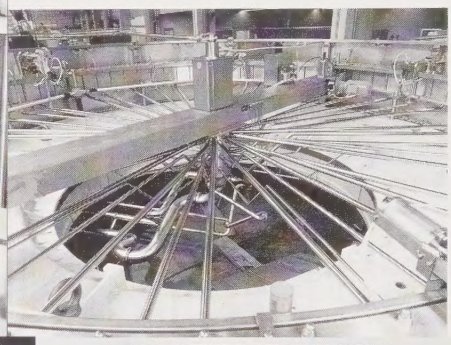
More than 15,000 attendees are expected at the Las Vegas show. They will represent a wide range of industries, including food and beverage; bakery and snack; cosmetics and toiletries; dairy; drugs and pharmaceutical; chemical; candy and confection; raw materials; paper and textiles; electronics/parts; computer hardware/software; entertainment; soaps and detergents.

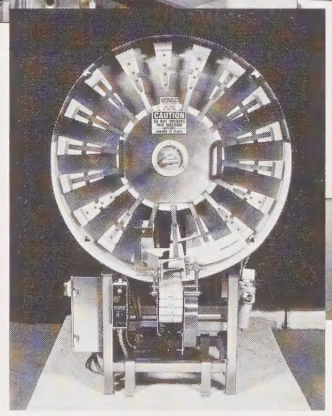
Nearly 700 exhibitors will bring their top solutions to even the toughest packaging challenges and display them in more than 300,000 square feet of show space.

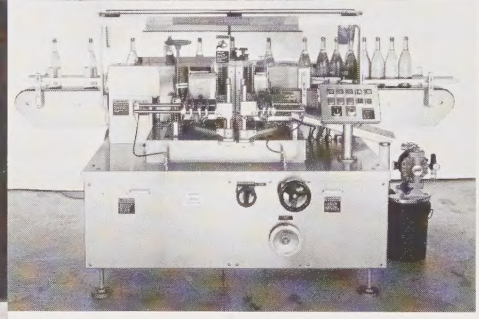
The International Exposition of Food Processors (IEFP) will co-locate with PACK EXPO. IEFP will focus on the newest developments in food and beverage processing.

IEFP is sponsored and produced by the Food Processing Machinery & Supplies Association (FPM&SA), which expects more than 300 exhibitors in an additional 100,000 square feet of displays.

Left: Attendees see innovative new equipment at work at PACK EXPO show.







Exhibitors include Krones (top right), New Jersey Machines (above), and McBrady Engineering (left).

In addition to the trade show, open 9 AM to 4 PM all three days, PACK EXPO and IEFP will offer Solutions 99, a conference providing insight into packaging and processing trends, issues, and problems. Expert speakers will address issues such as safety, advancing machinery, materials and container technologies, and the impact of those technologies on packaging and processing operations.

Six seminar sessions each morning cover a variety of topics. Those of most interest to the wine industry take place Tuesday and Wednesday, October 19 and 20.

On October 19, Session 4's panel discussion looks at "How OSHA'S New Ergonomics Standards Will Change Your Processing/Packaging Operations."

A companion seminar, "Politics, Productivity, and Worker Protection" covers basic, cost-effective solutions for preventing musculoskeletal injuries and illnesses while working with packaging machinery.

On October 20, Session 1, "Beyond Identity: Labeling Advances that Do More," includes a discussion of "OPP Labels, Labeling Systems for Cans, Canisters, Bottles, and Jars," "Invisible Labels with High Visibility," and "System Solutions to Unique Labeling Challenges."

Session 2 explores "How the New ANSI B155.1 Standard Will Affect the Way Packaging Machinery Is Designed, Built, and Operated" and "The Packaging Machinery Safety Standard Moves From Prescriptive to Process: Are You Prepared?"

Session 4 focuses on "Money Matters" and includes "An Easy Guide to Your Options for Financing New Packaging Machinery and Other Business Growth" and "Cutting Container Costs: How and When Container Distributors Stretch Packaging Budgets."

"Environmental Considerations" come under scrutiny in Session 6 with "Recycling Rears Its Ugly Head Again."

Fees for conference registration are $175 for one day or $345 for the full conference. Fees include a conference proceedings and admission to the trade show, which is $15 in advance or $25 at the show.

For additional information, visit the PMMI or IEFP websites: www.packexpo.com or www.iefp.org; e-mail PMMI at expo@pmmi.org; phone: 703/243-8555; fax: (703) 243-8556; or write: Packaging Machinery Manufacturers Institute 4350 North Fairfax Drive, Suite 600 Arlington, VA 22203.

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HOW WINEMAKERS IN BURGUNDY RECONCILE A STRONG TRADITION AND NEW TECHNOLOGIES

BY Vincent Gerbaux, engineer/project manager,
Centre Technique Interprofessionnel de la Vigne et du Vin
Beaune, France

The reputation that the wines of Burgundy now enjoy is founded on centuries of experience. Medieval monk winemakers began studying cultivation of the Pinot Noir grape variety in the soils of Burgundy in the 12th century. The definition of these different sites or *terroirs*, as they are known in Burgundy, has been refined over the 20th century.

Burgundy is known today primarily for its elegant white wines from various villages such as Meursault, Puligny-Montrachet, Aloxe-Corton, and Chablis, and for its noble red wines from different villages such as Pommard, Vougeot, Vosne-Romanée, and Gévrey-Chambertin. The Burgundy region is comprised of more than 500 separate viticultural parcels with yearly production totaling 1.2 million hectoliters (32 million gallons), 50% red wines and 50% white wines.

In the presentation of Burgundy wines, *terroir* is paramount. The grape variety is a given, and the winemaker always appears somewhat in the background on the label. His/her ability, which is essential in the making of a quality wine, continually evolves with improvements in viticultural and enological techniques. Today's technological innovations form the basis of tomorrow's traditions.

Terroir in Burgundy is a complex balance between:

- environment: soil, climate, exposition,
- plant: vine, viticultural techniques,
- vinification: local customs.

Two other factors can also be added to this complexity: the vintage and the winemaker's know-how.

It is well-known that a fine wine can only be produced from a quality harvest and in Burgundy this means:

- an increased plantation density (more than 10,000 vines per hectare, or about 4,050 vines per acre),
- a mature grapevine (more than 20 years old)
- limited yield (less than 40 hectoliters per hectare or 423 gallons per acre or 2.6 tons per acre).

White wines of Burgundy

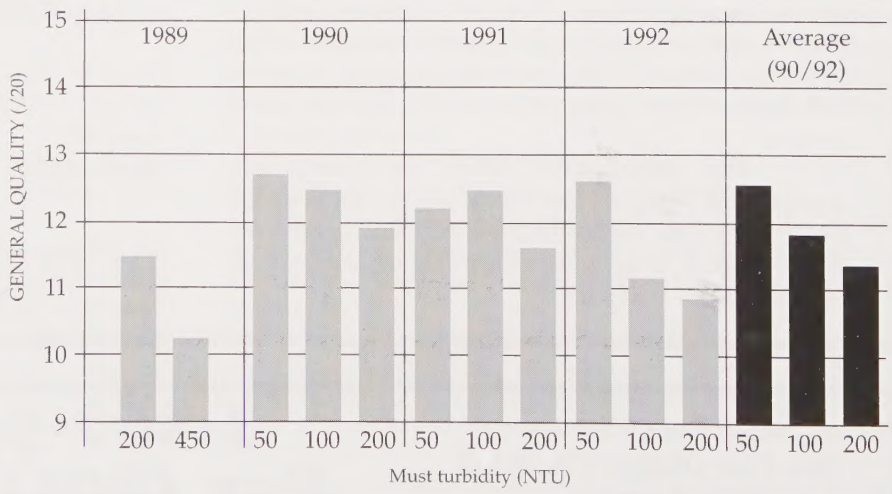
The Chardonnay grape variety has proven to be very geographically adaptable, giving satisfactory results in many wine regions of the world. In Burgundy, this has led to an emphasis on the quality of the harvest in order to distinguish the wines of the area from their international counterparts. This is especially important when one considers that traditional vinification of the fine white wines of Burgundy, located around the city of Beaune, is relatively basic. The process is as follows:

- manual harvest,
- pneumatic press,
- light settling,
- placement in 228-liter oak barrels (Bourgogne style),
- alcoholic fermentation,
- malolactic fermentation,
- conservation on the lees with periodic stirrings,
- racking, clarification, and bottling after nine to 12 months of barrel ageing.

Due to the high costs associated with this process, it is somewhat limited to only the more well-known appellations. The most reputable winemakers of the region have built their specific know-how on empirical observations while scientific research continually improves its ability to explain the effectiveness of these various vinification techniques.

Pre-fermentation operations have become the focus of ongoing, in-depth

Figure 1: Must turbidity and quality of Chardonnay wines (average values for all tasting achieved)



research. Settling, for example, is an operation dependent upon a number of different parameters: the sanitary state (degree of bunch rot infection on grapes) of the harvest, type of press, type of tank, amount of sulfur used, and temperature of the must.

Recent studies conducted in experimental tanks on four different, healthy (free of bunch rot) harvest vintages of Chardonnay (which were pressed in a horizontal press) showed that static settling of the musts, cooled to around 14°C, achieved four different levels of turbidity between 50 and 400 NTU (nephelos turbidity units). The musts were then vinified in stainless steel tanks. Beyond 200 NTU, the quality of the wine was affected by the presence of a reduced taste. Between 50 and 200 NTU, the wines showed improved quality, as musts with the lowest turbidity were preferred (Figure 1).

Sulfur dioxide

Studies on the addition of sulfur dioxide to musts from four different vintages from healthy harvests compared musts with no SO_2 added to those with 40 mg/L and 80 mg/L of SO_2 added. The musts were then vinified in stainless steel tanks. The initial browning of the non-sulfured musts disappeared during alcoholic fermentation.

Analysis of the resulting wines showed no significant differences between the wines from non-sulfited musts compared to those with SO_2 added. Sensory quality of the wines produced from the non-sulfited musts and those only lightly sulfited, 40 mg/L (Figure 2) were preferred.

The same studies were also conducted on three vintages from slightly botrytized harvests with the subsequent fermentations either in stainless steel tanks or oak barrels. With the stainless steel tanks, the results obtained with healthy grapes were confirmed. But with the oak barrels, the wine from non-sulfited musts tended to have a slight loss of sensory quality compared to those from sulfited musts.

In all cases, the finished wines obtained from non-sulfited musts had a higher proportion of free SO_2 (Table I). The absence of SO_2 in the musts limited the formation of binding elements, such as acetaldehyde, by the yeasts during alcoholic fermentation. Vinification of non-sulfured musts thus appears a good choice for the Chardonnay grape variety whose aromas develop progressively during vinification.

Yeast

The utilization of selected microorganisms is another topic continually debated by Burgundian winemakers. The addition of commercial yeast strains reduces problems related to difficult or incomplete alcoholic fermentations, and the resulting wines have lower quantities of volatile acidity than those achieved using only wild yeast strains (Table II). The balance is therefore analytically favorable to the addition of commercial yeast strains. For some winemakers, however, the natural, untampered alcoholic fermentation, along with its related problems, is qualitatively favorable to the fine wines of Burgundy. Both of these schools of thought have their highly reputable adherents among the best known domaines of Burgundy.

Malolactic bacteria

The use of selected commercial lactic bacteria is also a continually debated topic. The addition of such bacteria reduces the delay involved in completing malolactic fermentation, which in turn, permits a more rapid stabilization of the wine. It is also essential in avoiding oxidation, which can be quite detrimental to the wine's aromatic expression. This relatively new enological technique develops certain desirable characteristics, especially for white wines (Table III).

New oak barrels

The use of new oak barrels has become widespread for vinification of high-quality white wines. Placement in oak barrels can be done before, during, or after alcoholic fermentation. A study

Figure 2: Must sulfiting and quality of Chardonnay wines (average values for all tasting achieved)

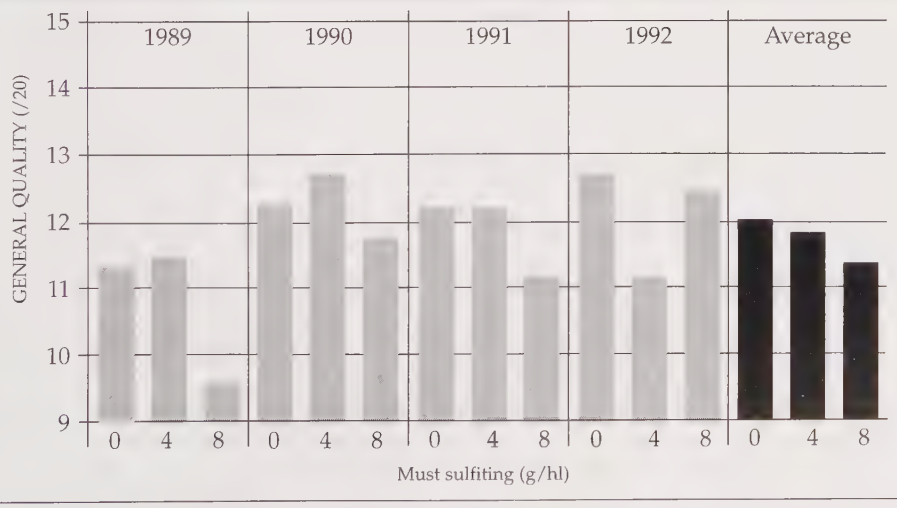


Table I: Influence of must sulfiting on SO_2 combination in a stabilized Chardonnay wine

	Must sulfiting (mg/L)	Total SO_2 (mg/L)	Free SO_2 (mg/L)	Free SO_2 (%)
	0	47	23	49
1990	40	57	15	26
	80	98	13	13
	0	81	47	58
1991	40	82	34	41
	80	97	25	26
	0	40	17	43
1992	40	45	12	27
	80	70	7	10
	0	**56**	**29**	**52%**
Averages	**40**	**61**	**20**	**33%**
	80	**88**	**15**	**17%**

of five different vintages shows that the quality of the wines that undergo complete barrel-fermentation remains high and steady during bottle-ageing. Those vintages placed in oak barrels after 75% of the alcoholic fermentation had been completed in stainless steel tanks show initial signs of similar quality, but their quality significantly diminishes over time (Figure 4).

Inversely, placement in oak barrels after alcoholic fermentation, retaining only the fine lees, initially produces a wine with limited appreciable quality, but its quality evolves quite favorably over time. Figure 4 shows the change in wine quality after six to 18 months, two to four years, and five to nine years. Wines vinified in inert tanks, whether on the gross lees or simply on fine lees, have a lower appreciable quality.

The wines that complete barrel fermentation present a much stronger aromatic expression with hints of toast, fresh wood, burnt wood, and butter. The apple aromas found in the other groups are significantly diminished. The wines vinified in stainless steel tanks on the gross lees tended to show more mineral qualities, while those vinified on only fine lees have a much more floral nature.

Table II: Influence of yeast and LAB inoculations on Chardonnay wines analysis and fermentations progress (exp. 1994, 1995, 1996)

	Tank		Oak barrel (1 year old)	
	no inoculation	inoculation	no inoculation	inoculation
Alcohol (%v/v)	13.6	13.6	13.7	13.6
Sugar (g/L)	1.4	1.1	1.5	1.2
pH	3.16	3.17	3.12	3.13
Total acidity (g/L H_2SO_4)	4.7	4.6	5.4	4.9
Volatile acidity (")	0.51	0.40	0.66	0.56
DO 420 (/1cm)	0.080	0.080	0.100	0.100
DO 280 (IPT)	6.8	6.9	8.1	8.0
Beginning AF (days)	4.5	2.5	4.5	2.5
Time AF (days)	35	27	34	27
End of AF difficult	2/6	1/6	2/6	1/6
Time MLF (days)	119	63	125	86
No realized MLF	0/6	0/6	2/6	0/6

Table III: Influence of LAB inoculation on wines tasting quality (real conditions in barrels)

Variety	Appellation	Significant difference between control and LAB inoculated	Preference to control (%)	Preference to LAB inocuoated (%)
Chardonnay	Rully	no	/	/
Chardonnay	Bourgogne	yes	28	72
Chardonnay	Chassagne 1er cru	yes	32	68
Chardonnay	Puligny 1er cru	yes	61	39

Red wines of Burgundy

The Pinot Noir grape variety, unlike Chardonnay, has very limited geographical adaptability. It seems to have found its greatest expression in the soils of Burgundy. Thus, although Burgundy has become a reference for fine, dry white wines, its noble red wines are often put on the same scale with those of Bordeaux. Bordeaux, however, experiences a situation with Cabernet Sauvignon somewhat similar to what Burgundy experiences with Chardonnay.

Cabernet Sauvignon seems to be quite geographically adaptable, giving satisfactory results throughout the viticultural world. The demands of the Pinot Noir grape variety offer the possibility of maintaining a very strong Burgundian identity.

Vinification of the noble red wines of Burgundy is more or less well-defined and depends largely on the winemaker's knowledge. The following list includes the most widely used techniques:

- manual harvest,
- triage (elimination, by hand, of mold-infected grapes from grape clusters),
- destemming (crushing optional),
- slow-starting alcoholic fermentation (low temperature),
- punch down twice daily (mechanical submersion of the cap into the must),
- peak temperature between 30°C and 32°C (86°-90°F) attained during maceration (skin contact),
- total maceration: 10 to 15 days,
- blending of free-run and first press fraction,
- settling,
- placement in oak barrels,
- malolactic fermentation,
- 12- to 18-month barrel ageing with one or two rackings

The Pinot Noir grape variety has a very limited polyphenolic potential. Therefore, research has been oriented toward mastering the extraction and conservation of these phenolic compounds. The development of Pinot Noir's aromatic expression is practiced in conjunction with extraction of the phenolic compounds.

Over the last 10 years, experiments have been conducted in experimental tanks to test different maceration (skin contact) conditions. The use of small

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(250 liter [60 gallon]) tanks offers a greater number of homogenous samples. Temperature regulation permits reproduction of conditions found in the large tanks. The technique for this includes:

- destemming and crushing,
- addition of 50mg/L of SO_2,
- addition of commercial yeast strains,
- total maceration: eight to 10 days,
- punch down twice daily (mechanical submersion of the cap into the must),
- tank temperature rises to 30°C and then subsequently decreases.

The comparative techniques include:

- no destemming,
- bleeding 15% to 20% of the tank volume,
- high dosage of SO_2 (300mg/L)
- extended maceration up to 16 days,
- pre-fermentation cold maceration: five days at 15°C,

Figure 3: Must sulfiting and quality of Chardonnay wines (exp. 1994-1996)

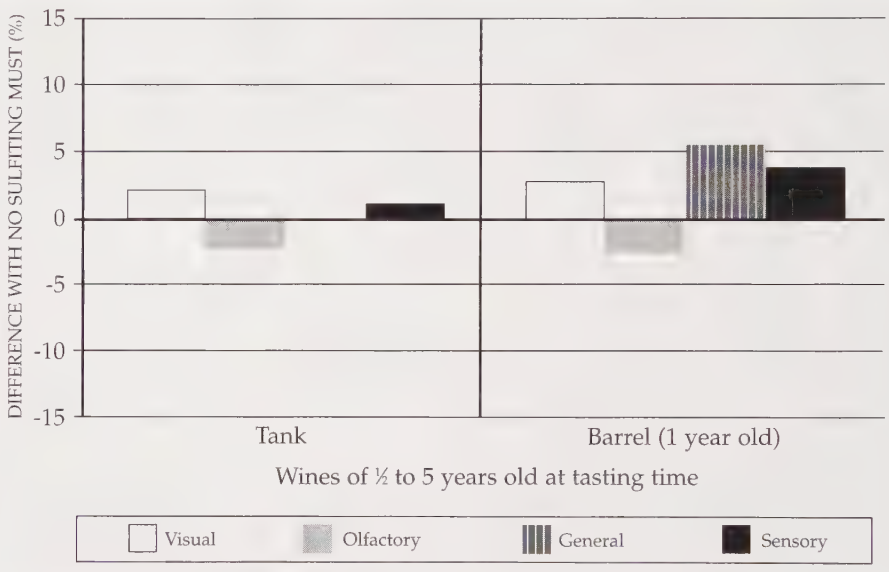

Figure 4: Influence of new barrel vinification or tank vinification on Chardonnay wine quality (exp. 1989 to 1993)

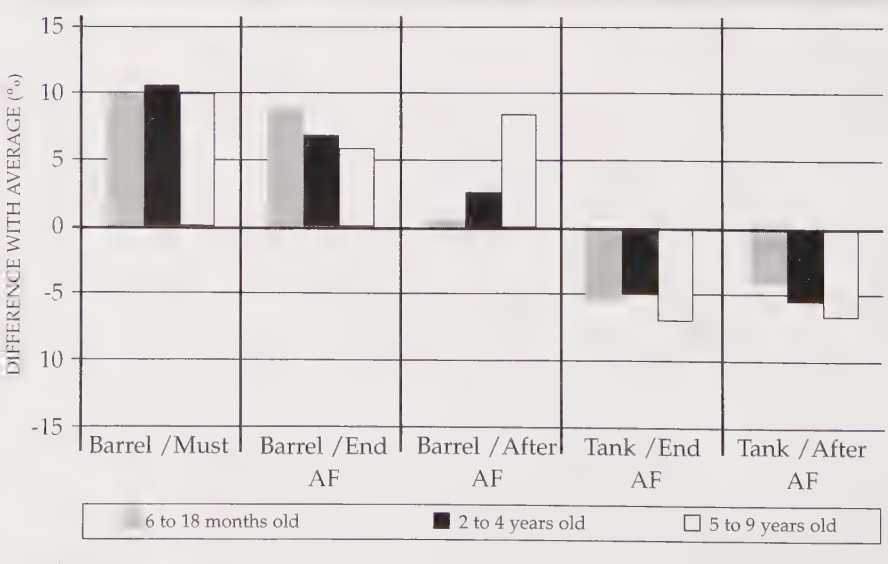

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Figure 5: Color intensity evolution

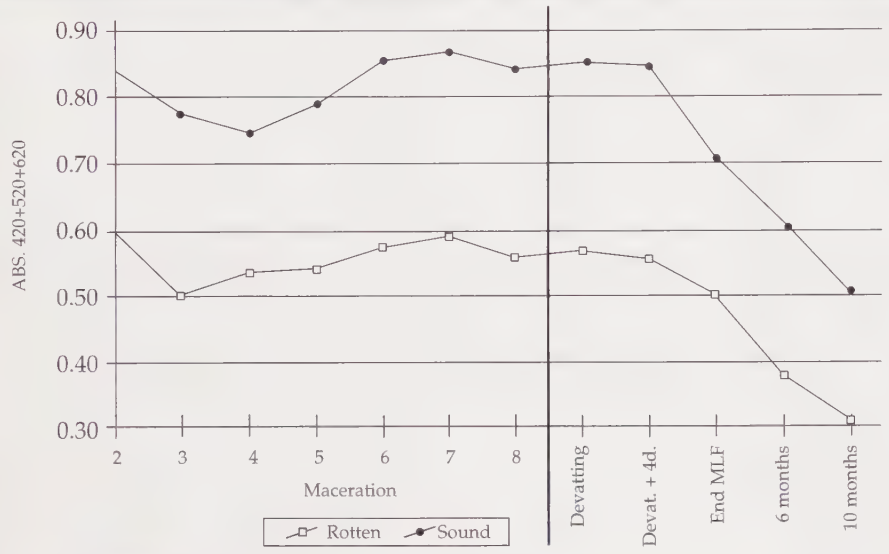


Figure 6: Influence of sulfiting or lysozyme addition after MLF on Pinot Noir wine quality, aged in barrels.

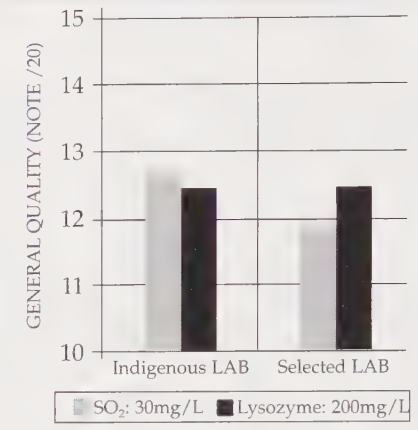
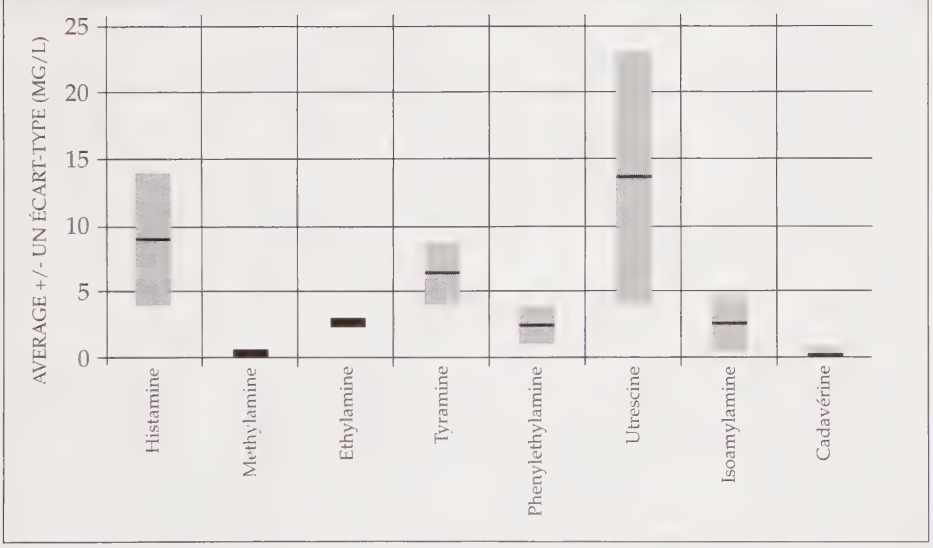


Figure 7: Average concentrations in biogenic amines of 300 Pinot Noir wines (vintages 1992 and 1993)



• initial heating of the tank: two days at 40°C,

• heating the tank at the end of the maceration period: two days at 40°C,

• steady increase in temperature from 21°C to 42°C during the time in the tank with no control on the first and last days.

The protocol of steady increase in temperature has evolved from the technique of heating the tank at the end of maceration. This process requires close temperature control, but it diminishes the overall "heating" aspect. In order to eliminate the vintage variable, the results are compared to those of the reference technique during the same vintage. The different experimental techniques had a limited influence on the chemical analysis of the wines. Heating the tank at the beginning of the maceration period increased the volatile acidity.

The results concerning extraction of phenolic compounds and their sensory qualities were more varied. Heating the tank at the end of the maceration and the steady increase in temperature were preferred because these techniques simultaneously produced an increase in color, anthocyanins and polyphenol content, and sensory quality.

To be risk-free, these techniques demand certain precautions. A complete fermentation of the sugars must be achieved before the temperature of the tank can be elevated above 32°C. The tank must be covered to avoid a loss of alcohol due to evaporation, and it must be cooled before racking.

Laccase

The presence of mold infection on grapes is generally accompanied by increased presence of laccase — an enzyme that oxidizes polyphenols. It is therefore particularly unfavorable to development of a quality red wine. Experiments conducted on both infected and non-infected grapes show considerable differences with regard to polyphenolic extraction.

In the presence of 15 units of laccase activity, the color intensity of the resulting wines is around 30% less than that obtained in wines from non-infected grapes (Figure 5). There is also a decrease in the concentration of anthocyanins and tannins.

The best method of eliminating the laccase is by careful sorting of grapes. When this sorting cannot be achieved, the recourse of heating the tank to 40°C before pressing eliminates laccase

Figure 8: Influence of LAB inoculation on biogenic amines concentration of Pinot Noir wines

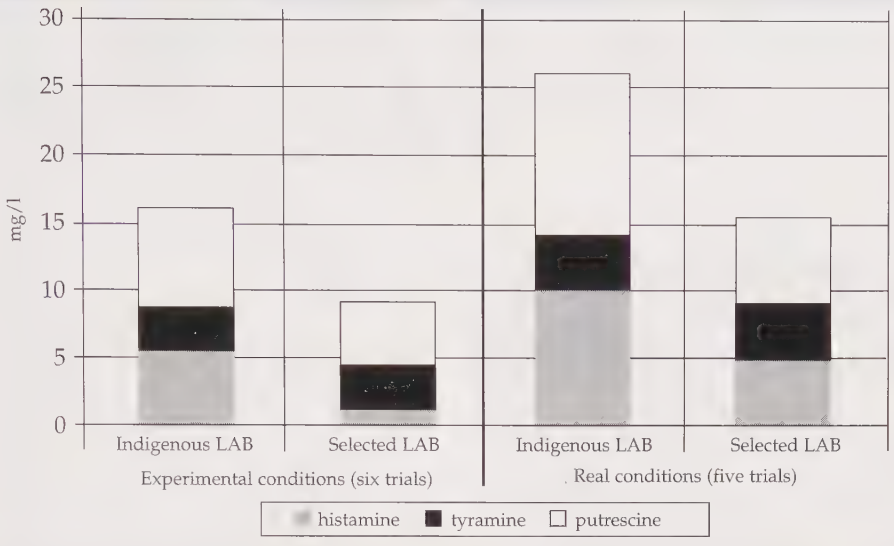
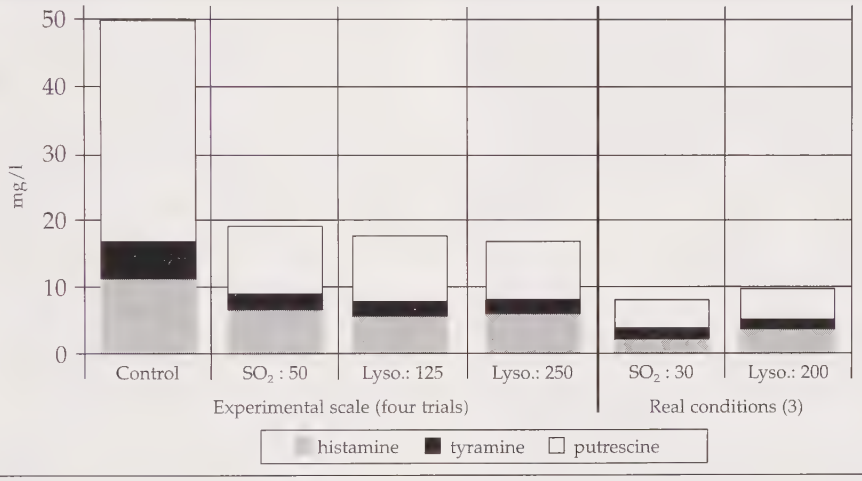


Figure 9: Utilization of lysozyme to stabilize Pinot Noir wines after MLF



activity. The color of the wine remains stable when exposed to air. In this experiment, we found that heating to 40°C in the presence of 13% alcohol is sufficient to deactivate the laccase enzyme.

A favorable extraction of polyphenols must be accompanied by a favorable evolution of these compounds during barrel ageing. In order to preserve color and other sensory qualities, Burgundy winemakers add very little SO_2 to stabilize the wines after malolactic fermentation, approximately 20 to 25 mg/L. This practice can prove to be insufficient to prevent further lactic bacteria activity.

Lysozyme

When the pH is raised, the risk of microbiological change is increased. The problem is generally limited by maintaining the wines at low temperature, around 12°C. Studies over the past few years involving lysozyme have shown that this component offers many advantages (Figure 6).

An addition of 200 mg/L permits the inhibition of further lactic bacteria activity. The winemaker can thus postpone the SO_2 addition, which allows the wines to barrel age on their lees without risk of microbiological change.

Barrel-ageing techniques used in Burgundy tend to favor an increase in

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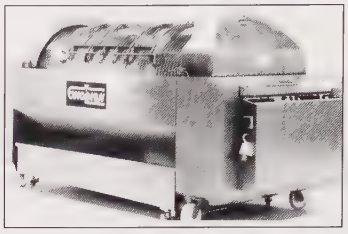

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the biogenic amine content of the wines, notably of histamine, tyramine, and putrescine (Figure 7).

These compounds are produced by some lactic bacteria. Conducting malolactic fermentation in oak barrels, a limited dosage of SO_2 and prolonged barrel ageing are often accompanied by a weak microbiological activity thus increasing production of the biogenic amines.

Adding commercially selected lactic bacteria for better control of the malolactic fermentation and the subsequent use of lysozyme to inhibit lactic bacteria activity limit the amount of biogenic amines found in wines (Figures 8 and 9).

A survey was conducted by the hospital of Nancy, which specializes in food allergies. Blind taste tests were conducted on healthy subjects and subjects declaring intolerance to wine. The tested wines contained either very little histamine (<1mg/L) or about 15 mg/L of histamine.

Clinical and biological observations showed that the presence of histamine plays no part in the adverse reactions to wines in either the healthy subjects and those declaring themselves intolerant to wines. Molecules other than the biogenic amines need to be researched in order to explain these intolerances.

Conclusions

Use of new oak barrels is a recent practice. Oak barrels, once considered only as containers, now contribute greatly to wine complexity. The best winemakers know how to reason the use of new oak according to the wine's own complexity. Some "big" wines are capable of handling 100% use of new oak whereas other wines are incapable of accepting more than 25% new oak without losing their varietal and regional character.

The white and red wines of Burgundy must place primary importance in *terroir*. This doesn't have to be proved; one only has to have tasted the different wines of one winemaker in order to understand its importance.

The practice of blending wine originating from different parcels is therefore practically non-existent. The more prominent winemakers prefer to let each parcel express its own originality through separate vinification. In order to complete this task, it is imperative to control grape yields and avoid excessive use of new oak barrels.

Because vinification is indeed a complex series of inextricably linked procedures in which the foreseen result can be completely destabilized by the displacement of one of these links, the best-known winemakers are often reluctant to use new technologies. Tradition and winemaker know-how have thus led to extreme caution. The "big" wines of Burgundy evolve slowly, refusing to be stressed. ■

Edited from presentation in the "Oak from Forest to Glass" Symposium sponsored by American Society for Enology & Viticulture, Eastern Section, and Southwest Missouri State University, July 1999.

STATE OF THE GRAPES — A WORLD VIEW

BY Barry Bedwell, president • Allied Grape Growers

California's winegrape growers have become increasingly aware over the last few years that they are truly functioning in a world market. This is especially evident when looking at the growing interaction between California vintners and foreign markets, whether in the sourcing of bulk premium wines or in the expansion of California's exports overseas.

Fluctuations in California's burgeoning premium varietal winegrape supply have meant substantial differences between times of significant wine imports (particularly of bulk wine in 1997 after the relative short harvests of 1993 through 1996) and substantial wine exports (as when California exports reached a record level in 1998 following the very large 1997 crop). In any case, California's wine industry is looking more than ever at the rest of the world as a potential customer, and of course, the world's wine-producing countries are viewing the U.S., with its strong economy and low per capita consumption, as the number one target to grow their sales.

In an attempt to better understand the potential of the major wine-producing nations of the world to fulfill consumer demand for premium varietals, particularly Chardonnay, Cabernet Sauvignon, and Merlot, we must first face the challenge of locating timely and accurate statistics.

While there is not universal agreement on the most appropriate source for such information, the O.I.V. (Office International de la Vigne et du Vin headquartered in Paris) looks to be a consistent, if not timely, source of global winegrape and wine production data. The main complaint about this information is the time lag between the actual grape and wine production and publication of the data. For example, 1997 statistics were not available until May 1999. However, the O.I.V. has a wealth of historical information that can be helpful when interpreting general trends around the world.

For the following analysis, statistics relating to the three basic categories of wine production, per capita consumption, and winegrape acreage for the years 1990 to 1997 were considered for the major wine-producing areas of Western Europe (France, Italy, Spain, Portugal, Germany, Austria, and Greece), Eastern Europe (Bulgaria, Hungary, Romania, former Soviet Union, and Yugoslavia), South America (Argentina, Brazil, and Chile), U.S., South Africa, and Australia.

Taken as a whole, and in conjunction with supplemental information relating to the increased production of the primary premium varietals, the trends discovered in these statistics paint what should be a fairly accurate representation of the current state and direction of the market in the short, and possibly intermediate, term.

In terms of world wine production in 1997, the Western European countries of France, Italy, and Spain represent 52.3% of the total (see Table I). The U.S. ranks fourth at 9.5%, but this figure is somewhat misleading, because 1997 was definitely a bumper crop year and the U.S. is historically closer to 6% to 7% of the world's total wine production.

Looking at the New World wine producers, we find Argentina is in fifth place (5.1%), South Africa seventh (3.3%), Australia 11th (2.3%), and Chile 13th (1.7%). Of course, these numbers reflect total wine production and do not begin to tell the story of the continuing movement worldwide to the primary premium varietals. This is the most important undercurrent existing in the wine industry today, and the New World wine producers, along with selected areas within Europe, are best positioned to ride it to success.

Western European trends are down

In the 1990s, Western European wine production has generally trended downward, going from a high of more than 5 billion gallons in 1992 to slightly more than 4 billion gallons in 1997. At the same time, per capita consumption in this region has decreased from just under 13 gallons annually in 1990 to about 11 gallons in 1997.

Acreage of producing winegrapes appears to be decreasing at an even faster rate, moving from approximately 9.5 million acres at the start of the decade to something between 7.5 and 8 million acres currently. However, contained within these numbers is the reality of a growing base of acreage producing pre-

Table I
Ranking of countries by percentage of world wine production

Rank	Country	Percent of Total
1	France	20.3%
2	Italy	19.2%
3	Spain	12.8%
4	United States	9.5%
5	Argentina	5.1%
6	Soviet Union (Former)	3.8%
7	South Africa	3.3%
8	Germany	3.2%
9	Yugoslav Republic (Former)	3.1%
10	Romania	2.5%
11	Australia	2.3%
12	Portugal	2.2%
13	Chile	1.7%
14	Hungary	1.7%
15	China	1.6%
16	Greece	1.5%
17	Brazil	1.0%
	Total	96.4%

(remaining are less than 1% each)
Source: O.I.V. 1997 Wine Production

mium varietals — Chardonnay, Cabernet Sauvignon, Merlot, Sauvignon Blanc, and Shiraz (Syrah).

The best example of the movement to premium varietals popular in the U.S. can be found in the Languedoc area in the south of France. In 1980, when this area included 840,000 acres of winegrapes, only about 23,000 acres (less than 3%) were devoted to the aforementioned varieties. By 1996, the total winegrape acreage had dropped to an estimated 766,000 acres, but the land dedicated to those same varietals had increased to almost 150,000 acres!

Estimates for the turn of the century predict the acreage for Chardonnay and Sauvignon Blanc will grow to about 16,000 each, Cabernet Sauvignon to around 38,000, Merlot to 62,000, and Shiraz (Syrah) to an astounding 66,000. Taken together, total acres committed to these varieties will be almost 200,000 or the equivalent of almost 75% of the comparable acreage in the U.S.

Tonnage estimates alone call for increases in production from 1996 to 2000 to range between 17% to 85% for individual varieties with an overall growth rate of 36% to more than 256,500 tons. Most observers believe this production will intensify competition at the California appellation level. Wine from Languedoc already served as a primary source of bulk product during the last shortage of varietal crops in California prior to 1997, and the contacts developed during that period will most likely facilitate growth in bulk importing in the future.

Eastern Europe, a growing force

Together Eastern European countries produce less than 20% of the wine their Western European counterparts do. While the eight-year trend for wine production in this area shows a decrease, from more than 900 million gallons in 1990 to slightly more than 800 million in 1997, the more accurate picture may be represented by the period from 1994 to 1997. It shows an increase of more than 100 million, up from 700 million gallons.

Per capita consumption in Eastern Europe, on the other hand, has risen from six gallons in 1990 to just under seven gallons in 1997, while reported acreage has held relatively consistent at between 1.0 to 1.1 million producing acres.

This is a region that appears to be in transition and beginning to feel the benefits of a free market economy. However, it is still struggling with problems, such as the lack of infrastructure and limited capital. U.S. producers' concern about the region's potential to expand varietal winegrape production legitimately is heightened by past reports of the misidentification of varietal wine exported to the U.S.

South America: Consumption off 38%

Wine production in South America has been greatly affected by individual yearly crop fluctuations. Production was stable at 530 to 560 million gallons between 1990 and 1993, but production shot up in 1994 to almost 660 million gallons and then fell to only about 500 million gallons in 1996. Production rose in 1997 but fell again in 1998. Reports for the current crop year put tonnage up but not yet back to normal.

A major variable in South America, and to a lesser extent in the U.S., is the production of grape juice concentrate, which can materially affect the amount of wine produced. Meanwhile, per capita wine consumption has fallen almost 38% from about 3.25 gallons in 1990 to just over 2.0 gallons now.

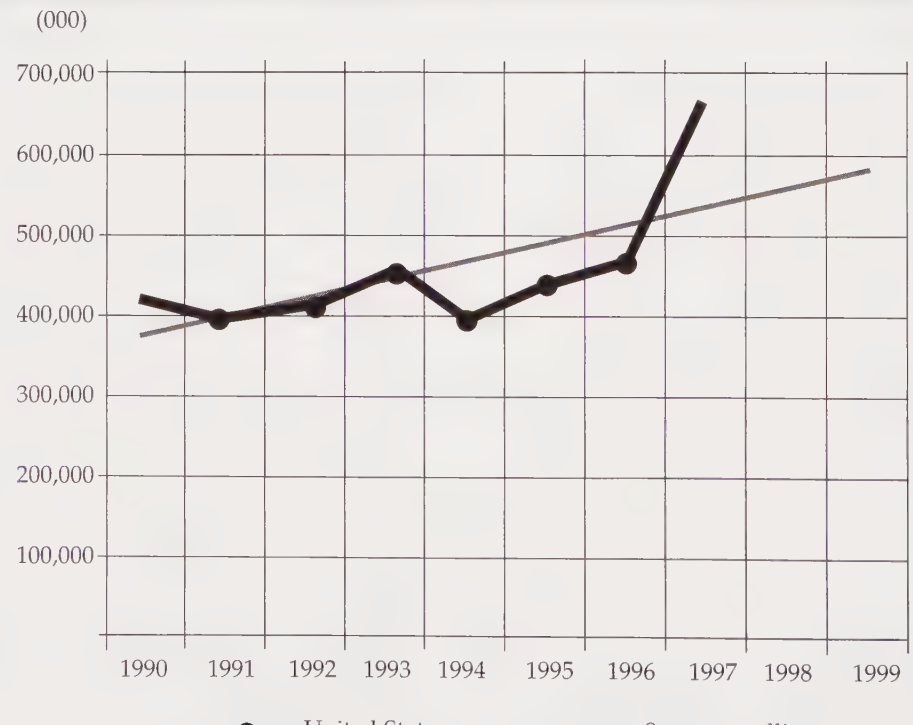
Acreage statistics are somewhat limited but present a stable base at just about 700,000 acres. However, firsthand observations indicate a continued growth in the amount of primary premium varietal acres in Argentina and Chile. Clearly, both of those countries have the potential, as well as the desire, to increase exports to the U.S. and compete at the California appellation level.

U.S. statistics less reliable

O.I.V. statistics for the U.S. winegrape producing acreage indicate approximately 325,000 producing winegrape acres in 1997. My firsthand knowledge says the actual acreage in that year for the entire U.S. is closer to 380,000 or 390,000.

The wine production trend, shown in Table II, with its spike in gallons due to the very large crop of 1997, is probably an accurate picture of the actual trend, which projects production at about 600 million gallons by 2000. Per capita con-

Table II
Wine production in thousands of gallons -United States



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sumption has been increasing slightly and stands at just less than 2.0 gallons. However, adult per capita consumption, which is a more accurate reflection of market potential, has been reported by John Gillespie (Wine Market Council) to be currently at 2.43 gallons, a level that obviously has growth potential.

South Africa: Increasing premium varietal acreage and production

A review of trends in South Africa reveals a pattern of almost no growth in wine production, per capita wine consumption, and winegrape acreage. But the truth is that premium varietal acreage and production are increasing at an impressive rate. In fact, excluding the acreage growth in such generic varieties as French Colombard and Chenin Blanc, premium varietal tonnage is predicted to jump 75% between 1997 and 2002. Chardonnay alone is expected to grow over 140% in that period.

However for the three varieties, Chardonnay, Cabernet Sauvignon, and Merlot, total tonnage in the year 2000 will still only be about 12% of the comparable production in California, so South Africa has some way to go before it competes globally as effectively as some other countries.

Formidable Australia

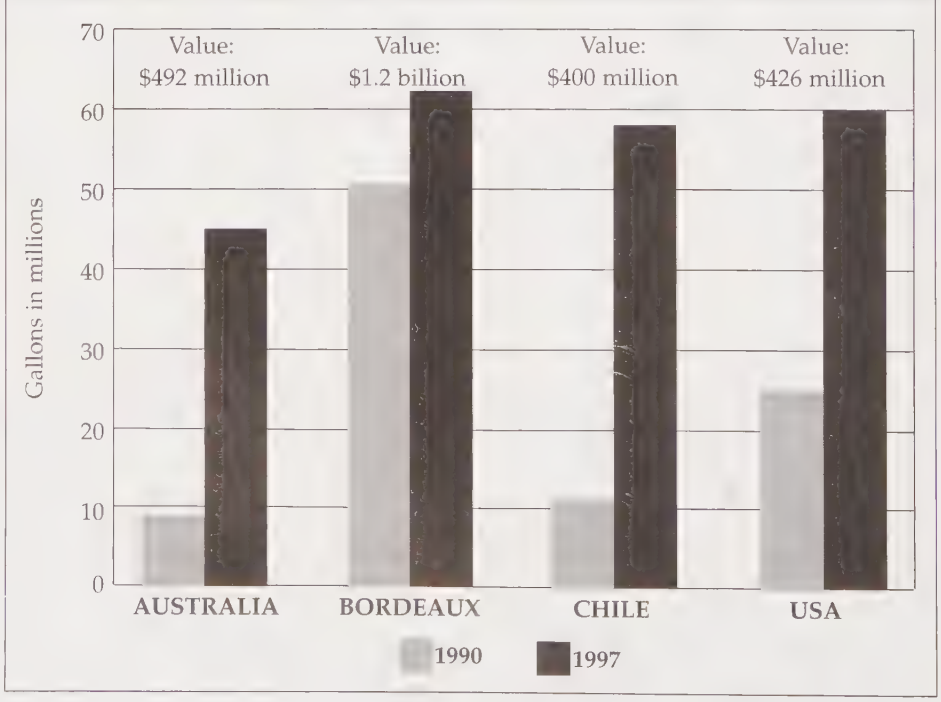
One country that is already competing around the world, and by all measurements will become an even more formidable competitor, is Australia. This is a region where all trends are definitely up, including acreage and production.

Australia's per capita consumption has been flat at about 4.8 gallons since before 1990, but the Australian wine industry's well-known strategic-planning process hopes to boost consumption to 5.8 by the year 2025. With only about 19 million people or just over 50% of California's population, however, the future market growth for Australian wine certainly lies beyond its continental borders.

Overall, premium winegrape projections for the year 2000 in Australia indicate production increasing about 40% from 1998 levels, which is in line with the amount of non-bearing acres — currently thought to represent almost 33% of total plantings. Australian experts are predicting an oversupply of white wine, primarily Chardonnay, in the short term and that red wine supplies will outstrip demand within four to five years.

It's projected that prices for winegrapes will fall between 35% and 42%

Table III
Wine export volume comparison, 1990-1997



from current levels by the year 2003. The U.S. will be a prime target for this increased production, which will provide additional competition not only in the California appellation category but also in some regional appellations in the super-premium classification.

The world picture

Reviewing the world wine balance sheet in terms of production, consumption, and acreage makes a challenging situation clear. Given normal yields, overall acreage and potential production are materially up, particularly for California-style premium varietals. Led by declines in Western Europe, world consumption on a per capita basis continues to decrease, though high-end consumption is stable or up.

There is no question the world is going to have more premium varietals to sell. The issue, therefore, for both growers and vintners worldwide is how to grow consumption. For many nations, the obvious answer is not to grow domestically but internationally.

The 1990s have been very good to New World wine producers, such as Australia, Chile, and the U.S., in increasing wine-export volume as evidenced by impressive jumps in both gallons shipped and dollar value (see Table III). The U.S. is coming off its best year ever; more than $537 million in wine was exported in 1998, more than four times U.S. wine exports at the beginning of the decade, according to the Wine Institute.

In 1998, wine exports represented 12% of California's wine volume — compared to 1% or 2% during much of the 1980s — and growth in exports actually exceeded growth of domestic shipments for the first time on an annual basis. But this success story is not unique to the U.S.; Australia and Chile show similar, if not more impressive, gains. Competition will only intensify, and the winners will be those offering the best combination of quality and value.

What does this mean to grapegrowers?

Where does this changing and ever more challenging world situation leave the California grapegrower, especially in light of the California planting boom over the past five years? The apparent answer depends on where the California grapegrower's vineyards are located.

Of the four major grapegrowing regions within California — the North Coast, Central Coast, Northern Interior, and the Central/Southern San Joaquin Valley — estimated rates of wine shipment growth necessary to accommodate the anticipated increases in tonnage vary significantly. These increasing tonnages are expected to represent a total increase for the four primary premium varieties (Chardonnay, Cabernet Sauvignon, Merlot, and Zinfandel) of between 32% to 48% from current levels by the year 2001. They dictate that the industry must achieve an overall premium varietal annual growth rate in sales of something between 7% and 14 %.

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However, when looking at the individual growing regions, these estimates of needed growth vary from a low of 2% in the North Coast, to 7% in the Central Coast, 8% in the Northern Interior, and 11% in the Central/Southern San Joaquin Valley. While these percentages are for the combined total of the four aforementioned varieties, an individual analysis for each of the individual varieties reveals a similar pattern. That is, generally speaking, the amount of growth needed for a particular variety is less for the North Coast than all other areas, less for the Central Coast than the interior regions, and less for the Northern Interior than the Central/Southern San Joaquin Valley.

Therefore, if you ask: "Does the industry have enough grapes planted at the current time?" (Or "Is there a potential oversupply?"), the proper response might be: for the North Coast — maybe; for the Central Coast — probably; for the Northern Interior — most likely; and for the Central/Southern San Joaquin Valley — yes. This conclusion clearly points out the benefits of specific appellation-based marketing programs that are likely to moderate or insulate some areas from the full impact of a supply/demand imbalance, given a continuation of the current strength of the economy.

One challenge that the California winegrape industry continues to face is that of compiling an accurate count of actual acreage already planted. The State of California's Agricultural Statistics Service (CASS), through the voluntary Grape Acreage Report published in June 1999, reported 427,281 acres of winegrapes, of which 84,734 were non-bearing.

For the first time, however, CASS used a statistical sample to measure the incompleteness in the gathered data. The sample consisted of 509 growers who were selected from the Department of Pesticide Regulation (DPR) application files. CASS reported that this extra effort was necessary because there is a large universe of approximately 10,000 grapegrowers, because new plantings continue unabated — including planting by growers who have not farmed grapes before — and because it is dependent upon voluntary cooperation for the data.

The results were surprising to some but expected by those who more closely follow new plantings. CASS estimates actual winegrape acreage at 507,000 acres, of which 122,000 acres (24%) are non-bearing. This represents an official wake-up call and may, more than anything else, define the need to increase wine consumption.

Despite the fact that planting contracts are very limited in the coastal areas and virtually non-existent in the interior regions, interest in adding winegrape acreage remains high in California. With the financial success of the last few years fresh in grapegrowers' minds, the amount of winegrapes planted on a speculative basis seems to be increasing, especially in light of the dismal financial shape of other crop alternatives.

This is indeed unfortunate, as the lesson learned during past oversupply problems — namely, do not plant without a contract — is seemingly forgotten. Grapegrowers are once again following a path to oversupply, unless plantings moderate and/or consumption patterns increase.

A call to action

The wine industry does truly have reasons for optimism, but success will require action and participation by the many varied segments of the industry in support of the goals and efforts of such organizations as the Wine Market Council, WineVision — American Wine in the 21st Century, Coalition for Free Trade, and the American Vineyard Foundation.

To do nothing and simply expect a continuation of current growth is to invite a repeat of past down cycles. On the other hand, a better handle on supply and on growing the market — internationally and particularly domestically — are proper and attainable goals. ■

Edited from a presentation in June to the 1999 Vineyard Economics Seminar.

Allied Grape Growers is a grower-owned marketing cooperative, representing grower members in Napa, Sonoma, Lake, Solano, and Mendocino counties, and San Joaquin Valley in California.

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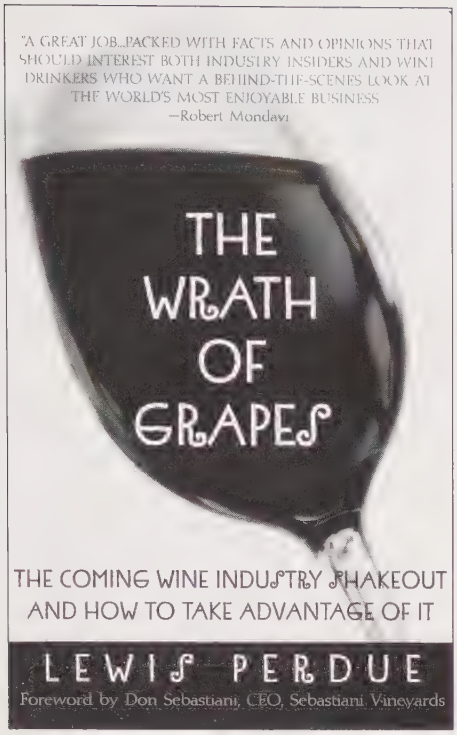
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THE COMING WINE INDUSTRY SHAKEOUT AND HOW TO TAKE ADVANTAGE OF IT
LEWIS PERDUE
Foreword by Don Sebastiani, CEO, Sebastiani Vineyards

Accusations, Accolades, and Dirty Laundry

BY Carol Caldwell-Ewart

How can consumers "use the [wine] industry's very woes to save money buying wine to drink, and ... invest intelligently in wine and wineries"? For outsiders who are thinking about investing in the industry that makes the wine they love to drink, Lew Perdue's new book provides insightful answers to these questions.

However, the book's title — *The Wrath of Grapes* — tells more about its interest for insiders: gossip and strong opinions sprinkled liberally with what may be sound advice.

At 250 pages or so, *Wrath* is a quick, spicy read, full of drama, gloom and doom, accusations, accolades, and dirty laundry. It's great fun, unless of course, it happens to be *your* dirty laundry!

Perdue was the founder and publisher of *Wine Business Monthly* and the *Insider*, which he sold to New World Wine Communications, Inc., in 1998 (and now declaims as "one of the industry's biggest cheerleaders"). He is currently president of IdeaWorx, an Internet e-commerce and marketing company, and also publisher of *Wine Investment News*. His bio includes 17 books and stints as a wine importer, founder of high tech companies, political animal, teacher, and journalist. He lives with his family in Sonoma, CA.

The book was born, Perdue says, out of his failed attempt to find venture capital to expand *Wine Business Monthly* onto the Web and into the consumer arena. "Everywhere I turned, in every VC [venture capital] board room, I heard an identical refrain: 'The industry's too small; the tiny growth potential is not worth the risk; returns are too small; your market is shrinking.' ...I started seeing the wine industry through their cold, cruel spectacles. Some of them had netted, in a year, more than the combined profits of the entire wine industry during the same period."

What Perdue sees, through the venture capitalists' spectacles, is an industry whose best-known joke suggests "How to make a small fortune in the wine industry." That's also the title of Part I, which contains seven chapters on what's wrong with the wine industry. Chapter by chapter, he outlines the afflictions of the industry — those the industry inflicts on itself and those inflicted by others.

In "The Coming Shakedown in the American Wine Industry" chapter, Perdue predicts that with the millennium will come a wine glut that "will hammer prices downward." Further, he points out, in the coming downturn, the industry will be threatened by the same villains that have plagued it in the past: stagnant or declining consumption; "anti-competitive" government regulation, and industry unwillingness to promote the product. "Consumption is the key. Consumption is the ultimate arbiter of success or failure for any product...there's no chance for economic success without demand."

"Why Don't People Drink More Wine?" Perdue asks in Chapter 2. "Mostly," he answers himself, "because the wine industry doesn't try very hard to sell it. Each year, the wine industry spends less and less advertising its product," and it fails "to capitalize upon the scientific research proving the benefits of moderate alcohol consumption."

Perdue believes vintners need an attitude adjustment. "Wine, most American winemakers think, is a privilege they bestow on civilization. The thought of having to ask someone to buy it is demeaning." He asserts that today's vintner sees the pinnacle of success as a secluded winery with no signage and an unlisted phone number.

In "Why Can't We All Just Get Along?" Perdue acknowledges that the wine industry is divided by some substantive issues; "but this is a self-fragmenting organism whose divisions are maintained by massive egos, blatant hatreds, mistrust, irreconcilable personality conflicts, generational splits, disagreement over political methods, and by the congenitally cantankerous arguing for the sake of argument." The result is an array of groups representing fragments of the industry. "It is a rare occasion when all these groups can agree on a single issue, and even rarer when they actually cooperate."

The Balkanized nature of the wine industry means it "cannot mount a con-

certed effort for almost anything," decries Perdue. Therefore, "it will be helpless at creating a promotional campaign to help increase consumption and prevent grape-glut-driven price drops — good for buying wine, bad for buying wine stocks." It will also make the industry more vulnerable to attacks by neo-Prohibitionists.

Phylloxera will cost the California wine industry at least $4 billion, and Perdue claims that this disaster didn't have to happen, because experts around the world knew that AxR1 was not resistant to Phylloxera. In California, the industry thought itself immune to the pest, however, and grapegrowers planted their vineyards with the wrong type of rootstock. Replanting these vineyards and related lost income will cost growers from $40,000 to $70,000 per acre, he predicts.

A dearth of funding for enology and viticulture research is also leaving the industry in the lurch. "The University of California system will not underwrite it, and the industry won't open its own checkbook." Now, a new disease — Black Goo — may be stalking California vineyards, Perdue reports, and an old problem, Pierce's Disease, "is back with a vengeance." Are these problems bigger than Phylloxera or no big deal? With little money to fund research, says Perdue, we're not likely to learn the answer soon.

Though 200-plus peer-reviewed scientific papers published in the word's greatest medical journals unanimously agree that wine is "actually good for you if you don't drink too much or too little," the wine industry does little to help itself with this information, Perdue complains. In "The Rx Files," he points out that "anti-alcohol forces spend more money each year promoting the neo-dry line than all of the advertising and promotional budgets of every American winery *combined*!" He predicts, "The wine industry's lack of will means that the real medical truth about moderate consumption will remain obscured, leaving consumers unaware of the truth — a truth that could prolong or even save their lives."

What book about the woes of the wine industry could be complete without a chapter on "The Relics of Prohibition"? Perdue does a fine job of explaining, so the layman can understand, the wine industry's perspective on the three-tier distribution system and the difficulty that wineries, particularly small wineries, face when trying to sell wine.

Finally, in "Counterfeit Wines: Fakes, Frauds, and the Merely Deceptive," Perdue reveals how the industry is ripped off by counterfeiters and how it rips off consumers. From French crooks in Cuba bottling fake $50 Moët et Chandon Brut Imperial to big American producers who have co-opted "European wine names, such as Chablis, Burgundy, Beaujolais, Chianti, Champagne, and others, for their own wine."

In sum, Part One of *The Wrath of Grapes*

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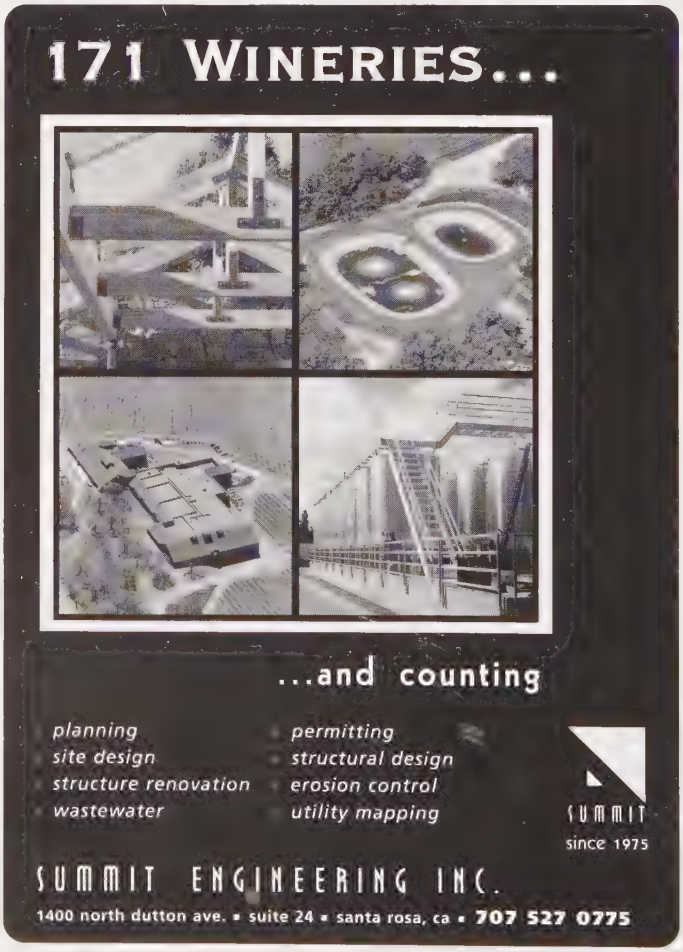

paints a grim picture for folks in the industry, but for outsiders, says Perdue, it can be an opportunity to invest. In Part Two, he teaches the basics of the industry and discusses the advantages and disadvantages of most of the ways it's possible to invest in the industry, from dirt to antique vintages to stocks.

Perdue's basic message to would-be investors is clear and repeated again and again. Wine is like sex, he says, it's best enjoyed for the love of it, not for the money involved. "If making money is your goal — either as an investor or a producer — you should not depend on wine to do it for you." Wine industry investors must accept, he says, "a rate of return that counts as average to mediocre and a risk that rates as extremely high when compared to other real estate investments."

Like the early chapters, the investing chapters are witty and lively and don't pull any punches. In "From the Dirt to the Bottle," Perdue assesses the costs and returns of growing grapes, identifying areas, such as labor, where costs might be expected to rise significantly in the next few years, and issues, such as a grape glut, that might cause revenues to plummet.

What does it cost to produce a bottle of wine? In "From the Grape to Your Lips," Perdue's chapter on the winery side of the business, he paints a clear picture of the costs and pitfalls of making, selling, and shipping wine. Profits can be large, he admits, but only for a select few.

This blast of the reality of wine industry economics may lead a would-be investor to conclude that he/she will ignore the business end of the industry and simply invest in the product. After all those old French wines are a great investment and some California wines are catching up, right? Wrong, says Perdue. In "Your Own Portfolio of Liquid Assets," he discusses how to invest in vintage wines, the investment potential of many wines, and how wine futures work.

"[Investment] wines are harder to sell than securities, require a precise storage environment, can go bad, need near anal-retentive record keeping to fetch top dollar, and involve hidden expenses and hassles unassociated with most other investments."

If you're going to buy wine as an investment, he advises, "Buy what you love so much you'd have no regrets if you were forced to drink them all yourself."

Maybe the best idea for the investor is just to fill his/her own cellar. "Opening Your Own Wine Exchange" offers great advice on how to select wines and create a wine cellar.

In "Handicapping Wine Investments," Perdue stresses again that "the soundest [wine industry] investments are riskier that the average tech or industrial stock, without the same upside potential." That said, he takes the list of wine-industry stocks traded on U.S. exchanges and provides an extensive profile of each company.

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In keeping with his theme that investors should invest for love not money, he ranks each company on a scale of one to 10 for the perquisites it gives stockholders, including possible dinners, trips, discounts on wine and other merchandise, and events. Most score a sorry zero, but Robert Mondavi Winery scores an eight with its "Partner's Circle" perks of discounts, limited release wines, special events, use of facilities, and concierge service.

Chalone Wine Group earns a 10 for inventing the wine-industry stock perquisite program. It continues to outshine the rest with an extravagant shareholder luncheon; dinners and events around the U.S.; use of facilities for private events; substantial discounts on wine; a catalog of shareholder-only wines and merchandise; a "wine dividend," based on number of shares, that investors can use for purchases; and package tours to wine regions around the world.

Investors must buy these stocks with their eyes open. Perdue predicts that over-production will drive prices down after 2000: "Unless the industry reverses its decades-long habit of doing nothing to help increase consumption, the millennium is shaping up to be a Titanic year." Poor investment choices will disappoint investors.

He says the wineries that will fare best under these conditions (and therefore would be the best investments) are large and benefit from economies of scale; have little debt; sell high-end wines; have a diverse profit base; own few vineyards.

A newer trend in vineyard financing are the Real Estate Investment Trusts (REITs). In his final chapter, "The REIT Stuff?" Perdue doesn't recommend them, though he says "REITS are one of the largest players in California vineyard investments with major holdings in Napa and Sonoma counties, either directly or as financing behind such growth wineries as Kendall-Jackson."

Don't miss the afterword and appendices. Perdue saves some of his pithiest comments for these sections. It's here that he cautions: "The wine industry, lacking coherent leadership or an aggressive plan to market its product, is almost entirely at the mercy of the general economic climate and of notoriously fickle consumer tastes. As a potential investor, you need always to keep firmly in sight that very little of the good financial performance by wineries in the last half of the 1990s was due to anything that companies, their management, or their industry associations did for themselves."

He attributes almost all growth to the boost brought by the *60 Minutes* French Paradox program and on a shortage of grapes as a result of weather and Phylloxera and says "record profits since 1996 came about by raising prices rather than selling more product."

Readers will finish *The Wrath of Grapes* with a sense that they've been on an affectionate glass-bottomed boat ride through the wine industry. This may not be the book that you'd loan to a waffling potential investor in your winery or vineyard, but if an investor who has already read it still wants to participate in your business, he or she may be your most realistic partner ever.

Ultimately, Perdue's book is a hopeful one, but he insists that people in the wine industry must "get off your duffs and make something happen." Something must be done to increase consumption, he says, and wine needs to be "demystified; promoted as an everyday beverage," one that consumers can enjoy with tuna casserole and Burger King.

The Wrath of Grapes is definitely a recommended read. ■

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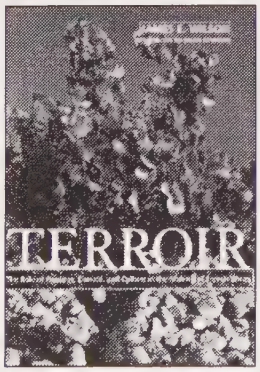

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Evaluation of

Cabernet Sauvignon: three vine spacings, two trellis systems

Oakville district, Napa Valley

BY Don Williams[1] and Richard Arnold[2]
Robert Mondavi Inc. Oakville, CA

High grapevine planting density, common in many parts of Europe, is a relatively new concept in California viticulture. Planting costs, equipment availability, the average price per ton of grapes, and California's soil and climate, which allow vines to grow fairly large in most valley floor locations, were all factors favoring fairly wide vine spacing. In Napa Valley prior to the late 1980s, it was rare to find vine densities exceeding 600 vines per acre, and 8x12 foot spacing (vine x row, totaling 454 vines per acre) was one of the most common plantings.

Emergence of phylloxera in Napa Valley in the 1980s made it clear that a large percentage of valley floor vineyards would need to be replanted before the turn of the century. While economically challenging, this created the opportunity to evaluate not only different rootstock selections, but also new clones, trellis systems, and vine planting densities. The possible impact of high-density plantings in Napa Valley vineyards on vine growth, crop yield, and wine style was largely unknown.

In 1985, one vineyard in the Oakville district of Napa Valley was planted with 1x1.8 meter vine spacing, a density of 2,178 vines per acre. This was the first large-scale planting (35 acres) at this density in Napa Valley. When the vines matured, the vineyard demonstrated that it was possible to produce high quality wines from closely spaced vines. No alternate spacings were planted, however, so relative differences could not be compared.

In 1989 Robert Mondavi Winery established a trial on six acres of the To-Kalon estate in Oakville, CA, to assess the effects of yield and wine style from different vine spacings. Crop yield and shoot growth characteristics have been recorded every year since 1992, and wine quality differences have been evaluated on a production scale (4 to 8 tons) since 1993.

Materials and methods

There are three vine spacings in the trial: 1x1 meter (3.1 x 3.1 feet), referred to as *close* treatment, 1 x 1.8 meter (3.1 x 3.6 feet), *moderate* treatment, and 1.5 x 2.7 meters (5 x 9 feet), *wide* treatment. A vertical trellis with shoot-positioning wires (VSP) is used in the close and moderate spacings. In the 1.5 x 2.7 meter spacing, two different trellis systems were compared: VSP trellis (*wide* treatment) and a divided-canopy Lyre trellis (*Lyre* treatment). These four treatments are described in Table I. Each treatment has two replicates, totaling 1.5 acres per treatment.

Two rootstocks, 110R and 5C, were planted in each vine spacing to observe potential differences between rootstocks. Approximately half the rows in each treatment and block were planted to each of the two rootstocks.

The rootstocks were planted in the spring of 1989 and field-budded with Cabernet Sauvignon FPMS Clone 8 that fall. The vines were trained out into bilateral cordons in 1990 and 1991. Quadrilateral cordons were established in the Lyre trellis treatment in 1991 and 1992.

Soil in the trial area is described as Bale series clay-loam. The soil is deep, with no apparent restriction zones down to at least three meters. Drainage is fairly good. Row orientation is northeast-southwest, with a gentle slope of less than 3%.

All treatments use vertical shoot positioning wires, but the cordon and top wire heights vary. For the close spacing, the cordon wire was established 51 cm (20 inches) above ground level, and the top wire positioned at 122 cm (48 inches). For both the moderate and wide treatments, the cordon wire was at 76 cm (30 inches) and the top wire at 173 cm (68 inches). The Lyre trellis had the highest cordon development, with the cordons positioned at 112 cm (44 inches) and the top wire at 198 (78 inches).

The vines were balance-pruned each year to 15 or 16 nodes per kilogram of pruning weight. Because of vine vigor differences, cordon development time differed between the treatments. Cordons in the moderate and wide spacings filled out the trellis within three to five years. The close-spacing cordons took longer to establish, and some vines in the Lyre trellis still do not have cordons fully developed. Shoot spacing was kept similar in all treatments, averaging 16 centimeters between two-bud spurs.

There were two replications of each treatment. Data vine sets used six vines per rootstock per block in the moderate, wide, and Lyre treatments (n=24), and 10 vines per rootstock per block in the close spacing (n=40). Since this report focuses on vine spacing, the averages for the two rootstocks in each treatment have been combined and are presented together, though a few comments on major differences found between the rootstocks are mentioned in the results.

Because the trial involved production-scale lots (4 to 8 tons), with the goal of maximizing wine quality for

each treatment, some cultural practices differed between treatments. These included irrigation amounts and timing of tillage.

Parameters

For most parameters presented, values represent seven-year averages (1992 to 1998). Leaf-area estimation data was not collected in 1996 or 1997, so all leaf-area parameters represent five-year averages (1992 to 1995 and 1998). Single-factor statistical analysis of variance was run on the viticultural data, evaluating treatment by year. Statistical differences reported are all at .05 significance level.

Light readings were taken in the fruiting zone with a Decagon Corp. 80-sensor ceptometer. Readings were usually taken in August, shortly after veraison.

Leaf-size determination from 1992 to 1995 was made by a weight/size calculation. In each treatment, two 20-leaf samples per rootstock and block were taken from data vines in early August (after hedging). Main shoot leaves (taken equally from the basal, mid-, and upper portions of the shoot) and lateral leaves were sampled separately.

After the petiole stem was excised, 20 leaves from each sample were weighed as a group and an average leaf weight was recorded. A cork borer of known area was then used to cut out discs from the mid-portion of each leaf, and the 20 discs were weighed. Leaf size was calculated by comparing disc size/disc weight against the leaf weight.

In 1998, the leaf size was determined by a leaf area measuring device (Delta T Manufacturing Co.) at the University of California Oakville Experimental Vineyard. Some leaves were subsequently sized using the earlier size/weight ratio method for comparison, and differences between the two techniques were found to be less than 10%.

Node number was determined by node counts of data vine shoots after leaf fall, usually in December. While some lateral nodes had broken off, particularly in years of early rain or frost, it was presumed that the lateral leaf area not accounted for was small.

Grapes were hand-harvested, crushed in an Amos crusher/destemmer, and fer-

Table I: Vine spacing treatments

Treatment name	Vine spacing (vine x row)	Trellis system	Number of vines/acre	Area per vine (sq. meters)
Close	1 x 1 meter	Single VSP	3928	1.0
Moderate	1.0 x 1.8 m	Single VSP	2178	1.8
Wide	1.5 x 2.7 m	Single VSP	968	4.1
Lyre	1.5 x 2.7 m	Lyre with VSP	968	4.1

Table II: Average vine growth date (1992-1998)

Treatment name	Shoot # per vine	Shoot weight (g)	Pruning wt. per vine (kg)	Pruning wt. per meter cordon (kg)	Pruning wt. per meter^2 of soil
Close	8.7 c	44.1 b	.40 c	.40	.40
Moderate	11.7 c	58.0 ab	.69 b	.69	.38
Wide	16.6 b	63.2 a	1.08 a	.72	.27
Lyre	26.4 a	50.9ab	1.35 a	.45	.33
(LSD, .05)	4.0	16.0	0.3		

Table III: Leaf area measurements (averages 1992-1995, 1998)

Treatment name	Node number per main shoot	Main shoot leaf size (cm^2)	Total leaf area per shoot (m^2)	Percent lateral leaf area
Close	15.4 b	114.6 a	.28 a	24.4 a
Moderate	18.5 a	129.7 a	.32 a	18.6 a
Wide	18.7 a	127.4 a	.34 a	17.5 a
Lyre	18.4 a	121.3 a	.28 a	12.8 a
(LSD, .05)	2.0	28.0	0.10	15.0

Table IV: Vine yield components (averages 1992-1998)

Treatment name	Cluster number per vine	Cluster weight (kg)	Berry weight (g)	Number of berries per cluster	Crop weight (kg/vine)	Calculated tons per acre
Close	13.1 c	.119 c	1.07 a	111 c	1.57 d	6.8 a
Moderate	19.5 c	.150 b	1.11 a	135 b	2.92 c	7.0 a
Wide	29.5 b	.177 a	1.16 a	154 a	5.25 b	5.6 a
Lyre	42.7 a	.154 b	1.17 a	132 b	6.56 a	7.0 a
(LSD, .05)	7.0	0.02	0.10	17.0	1.10	2.0

mented in 10-ton stainless steel tanks. Skin contact time was four to five weeks, depending on the vintage. The wines were pressed in a membrane press, and 10-gallon samples were taken after draining and pressing. The wine samples completed malolactic fermentation, were put through a racking and SO_2 addition program, and were bottled without wood ageing for analytical and sensory evaluation.

Results

Canopy growth — Vine growth data are listed in Table II and leaf canopy data in Table III. Shoot number increased with wider vine spacing. The wide spacing, with 50% more space between vines, averaged 91% more shoots per vine than the close spacing and 42% more shoots per vine than the moderate spacing.

The close and moderate spacing treatments both have one meter separation within the vine row, but due to stronger shoot vigor and earlier cordon development, the moderate spacing averaged more shoots per vine every year until 1998. Shoot number per vine differences between the close and moderate vine spacing were not significant, however.

At the 1.5 x 2.7 meter spacing, the divided-canopy Lyre trellis averaged 59% more shoots than the single-canopy wide treatment. Since the Lyre trellis has twice the available cordon wire length, this indicates that the Lyre cordons have not completely filled the available trellis wire.

On a per vine basis, as vine spacing increased, the pruning weight increased by a higher percentage than the number of shoots. Therefore the average shoot weight increased with vine spacing, with the wide-spacing shoots significantly heavier than the close-spacing shoots. On a per-square-meter-of-soil basis, however, the ratio is reversed, with the close spacing having the highest pruning-weight and shoot-weight values and the wide spacing having the lowest of these values of the three vine spacings.

Due primarily to a lower hedging height, the close spacing averaged three fewer nodes per main shoot than the other three treatments. The moderate, wide, and Lyre treatments had similar average node numbers per shoot after top hedging. Main shoot leaf size, total leaf area per shoot, and percent lateral leaf area did not show significant differences.

The close spacing and Lyre treatments represent the extremes in per-vine values for number of shoots, cluster number, crop yield, pruning weight, and percent lateral leaf area (though differences in canopy hedging height probably affected lateral shoot production). For a number of other parameters, the Lyre trellis values were closer to the close spacing than either the moderate or wide spacings, including average shoot weight, cluster weight, leaf size, and total leaf area per shoot.

Crop yield parameters — Table IV shows seven-year averages of crop yield parameters. Cluster number and

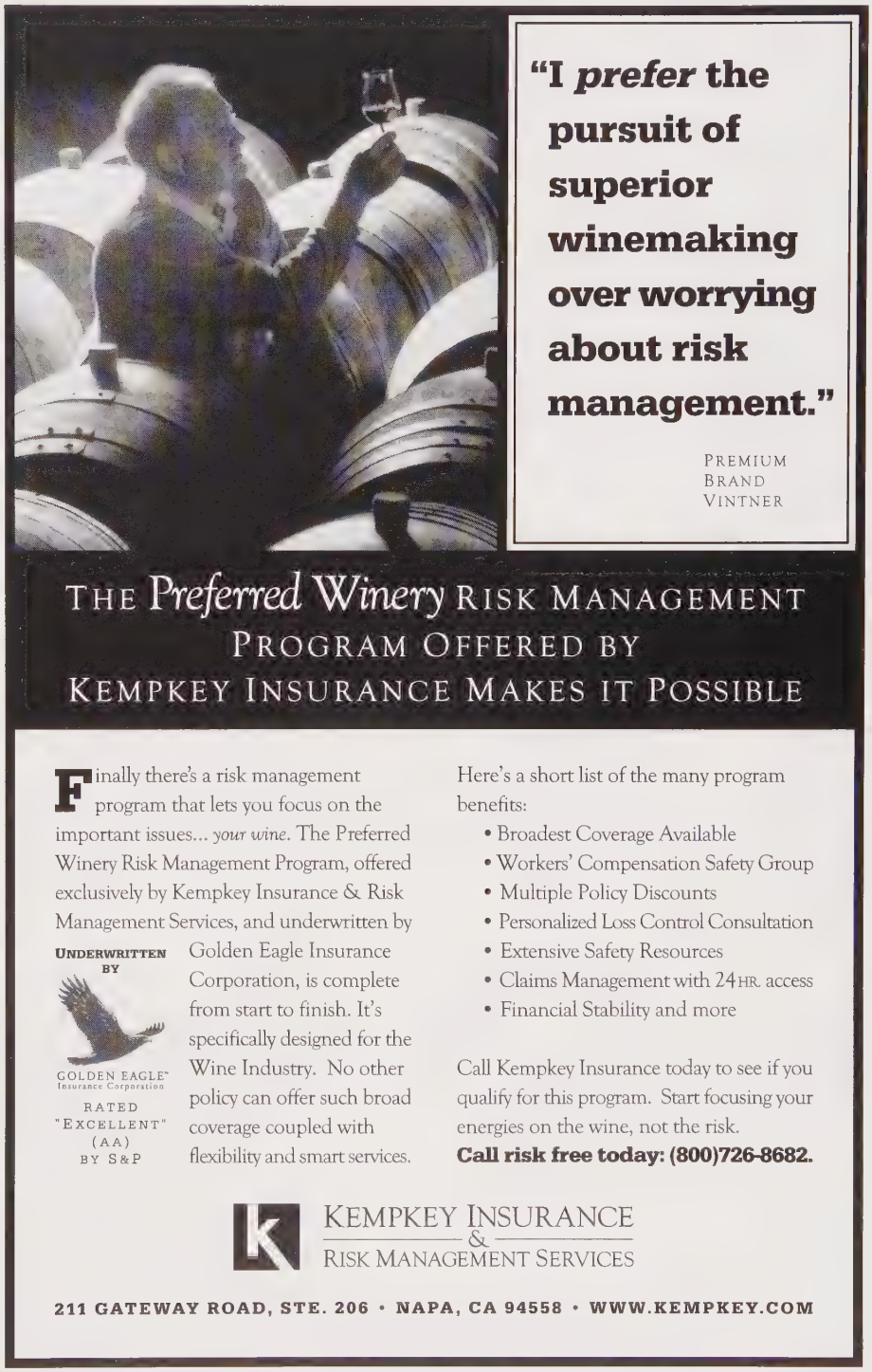
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Table V: Average canopy to crop ratios

Treatment name	Crop weight: pruning weight	Leaf area: crop weight (cm^2/g)
Close	4.1 a	15.2 a
Moderate	4.4 a	14.2 a
Wide	5.2 a	11.9 a
Lyre	5.1 a	11.6 a
(LSD, .05)	1.37	4.51

crop weight per vine increased as vine spacing increased, primarily due to increased shoot number per vine. Cluster weight also increased, with a 49% increase from the close to the wide spacings.

The increase in cluster weight was due primarily to significantly more berries per cluster with each increase in vine spacing. There was a trend towards increased berry size with wider vine spacing, but the differences were not significant. The increase in both cluster weight and berry number per cluster as vine spacing increased occurred in all seven vintages.

Comparing trellis systems at the 1.5 x 2.7 meter spacing, the Lyre trellis had significantly more clusters and greater crop weight per vine, due to more shoots, but significantly lower cluster weight and number of berries per cluster than the single-canopy, wide-spacing vines.

Total yields over the seven years averaged between 6.8 to 7.0 tons per acre for the close, moderate, and Lyre treatments. In no individual vintage were the values that close, however, and the close, moderate, and Lyre treatments each had years where they had the highest calculated tons per acre. The wide spacing averaged 5.6 tons per acre, approximately 20% lower than the other three treatments, but this difference was not significant at the .05 level.

Canopy/crop ratios — Table V lists two common ratios that relate canopy growth to crop yield. Differences between values were not significant, but the two 1.5 x 2.7 meter treatments averaged approximately 20% higher crop-weight/pruning-weight ratios and 20% lower leaf-area/crop-weight ratios than the two closer vine spacing treatments.

Rootstock differences — The vines on 110R rootstock established themselves earlier and have averaged slightly higher vine-vigor values (shoot number, shoot weight, pruning weight per vine, cluster number per vine, and leaf-area/crop-weight ratio) than the vines on 5C rootstock. The 5C vines averaged slightly higher crop-yield values (berry weight, cluster weight, crop weight per vine, tons per acre, and crop-weight/pruning-weight ratio). Differences between rootstocks that exceeded 10% are listed in Table VI.

Table VI: 110R and 5C rootstock comparisons of parameters exceeding 10 percent (All vine spacings and trellis systems averaged together)

Rootstock	Cluster weight (kg)	Crop weight to pruning weight ratio	% lateral leaf area	Leaf area to crop weight ratio (cm^2/g)
110R	.143	4.4	19.3	13.5
5C	.157	5.0	17.3	12.0

Must and wine analysis —Malic acid, tartaric acid, and arginine content of berries sampled just prior to harvest are presented in Table VII, and wine analysis data are in Table VIII. The goal was to harvest the treatments between 23.0° and 24.5° Brix, depending on the vintage, and to have no more than 0.5° Brix separation between treatments in any one year. This was accomplished in most, but not all vintages, as other berry maturity characteristics were also used as criteria for harvest. Since the wines were not always picked at similar Brix values, statistics have not been run on wine analysis.

In most vintages, harvest of the four

Table VII: Average analysis of last berry samples prior to harvest, 1992-1998

Treatment name	Malic acid (g/l)	Tartaric acid (g/l)	Arginine (ppm)
Close	1.7	6.5	105
Moderate	1.8	6.5	105
Wide	1.7	6.7	101
Lyre	1.9	6.4	81

Table VIII: Average wine analysis values, 1992-1998

Treatment name	Alcohol	TA(g/l)	pH	K+	Total phenolics (A280)	Color intensity
Close	13.2	5.1	3.87	1490	55.7	8.90
Moderate	13.2	5.3	3.88	1507	56.6	9.03
Wide	13.4	5.3	3.81	1393	54.9	9.33
Lyre	13.4	5.1	3.89	1512	55.4	9.03

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treatments happened within one week of each other. The close spacing was usually harvested first, but often had a lower alcohol content. Averaged across all vintages, the wine alcohol levels were all between 13.2% and 13.4%.

The wide spacing had the highest average color intensity (sum of absorbance values from the 420, 520, and 620 wavelengths). The close spacing had the highest color intensity in several vintages, but over-cropping in 1993 resulted in much lower color intensity and total phenolic (A280) values that particular year.

Most other berry and wine parameters showed few consistent trends from vintage to vintage. These included wine potassium content and malic acid, tartaric acid, and arginine values from berry samples taken just prior to harvest.

Sensory evaluation — Duo-trio difference tastings (in dark glasses) and preference-ranking tastings (blind, in clear glasses) were performed on pre-aged wine samples in all vintages from 1992 through 1997. Only preference-ranking tasting was performed on the 1998 wines. In 1992, separate wines were made from the two rootstocks in all spacings, and tasting evaluations were made within each rootstock. In 1997, the Lyre trellis was not evaluated due to a very sluggish alcoholic fermentation.

No significant differences were found between any wines in 1996 or 1997 or within the 110R rootstock wines in 1992. In other vintages significant differences at the .05 or higher level were found in several treatment comparisons.

Difference tastings between the close and moderate spacing wines showed significant differences in three of the six vintages they were compared. Comparisons between both close-to-wide and moderate-to-wide spacing wines were significantly different in two of five vintages in which they were evaluated. The Lyre-trellis wine was significantly different from the wide-spacing wine in only one of five vintages.

In the preference-ranking tastings, the tasters were asked to rank the wines for overall preference in all vintages, rather than being directed towards any particular attribute. Significant preference between wines was only found in two vintages, 1995 and 1998. In 1995, both the wide and Lyre wines were significantly preferred to the moderate-spacing wine. In 1998, the close spacing was significantly preferred to the moderate- and wide-spacing wines, and the Lyre trellis was significantly preferred to the moderate-spacing wine.

Discussion

When this trial was being set up, it was apparent that not all cultural practices could be identical in the growth and development of the vines. Different trellis and canopy heights, variable harvest maturity, amounts of irrigation and thinning, and choosing what criteria to normalize for comparison purposes were factors that needed consideration.

Differences in vine size ruled out establishing any per vine parameters to normalize. Having similar tons per acre

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yield was considered, and multi-year averages of three of the four treatments have very close values. While economic comparisons on a per acre basis may be useful, optimum wine quality may result from different tons per acre yields for the different vine spacing.

It was decided that the most valid way to compare the different vine spacings was to use the same shoot spacing and balanced pruning formula, and aim for similar canopy-growth/crop-yield ratios (crop weight/pruning weight or leaf area/crop weight). Accurately predicting these ratios prior to harvest is difficult, however. While differences between treatment ratios were not significant in this trial, they did exceed 20%.

Harvest timing varied because these were production-scale wine lots, and the winemakers were looking at berry flavor development and phenolic changes in skins and seeds as guides for determining harvest timing. Unfortunately, these did not always occur at similar Brix levels between treatments. If the Brix differences were too large, however, phenolic extraction differences from differential alcohol levels would occur. In some vintages a compromise was reached in an attempt to keep treatment alcohol levels within 0.5% by volume.

Concerns of excessive fruit shading with closer vine spacing have not been realized in this trial site. Although the canopy height exceeds the row width in the meter-by-meter spacing, and lateral leaf area is highest in this spacing, a desirable light environment still existed (light readings in the fruiting zone averaged over 15% of ambient in all treatments). The VSP trellis pulls most of the leaves out of the fruiting zone, allowing adequate light penetration to the fruit. In addition, at Napa Valley's latitude (37 North), sunburn damage is a concern during summer heat spikes, and partial fruit shading is desirable.

Based on our winemaking experience over the seven years of this trial, keeping crop-weight/pruning-weight ratios in the 3.5 to 4.5 range and keeping yields under seven tons per acre are desirable for optimal Cabernet Sauvignon from this site. Use of cover crops in high-rainfall years and veraison crop thinning in higher-yielding years are tools that can be used to keep canopy and crop levels from getting too high.

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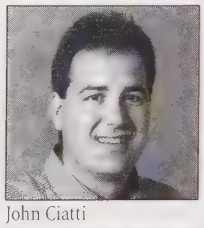
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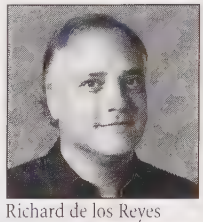
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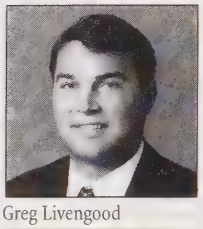
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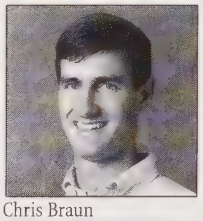
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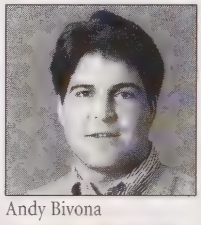
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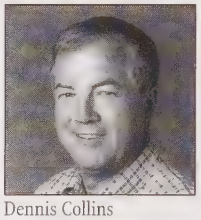
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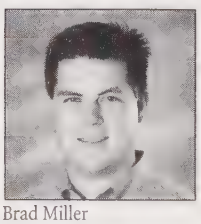
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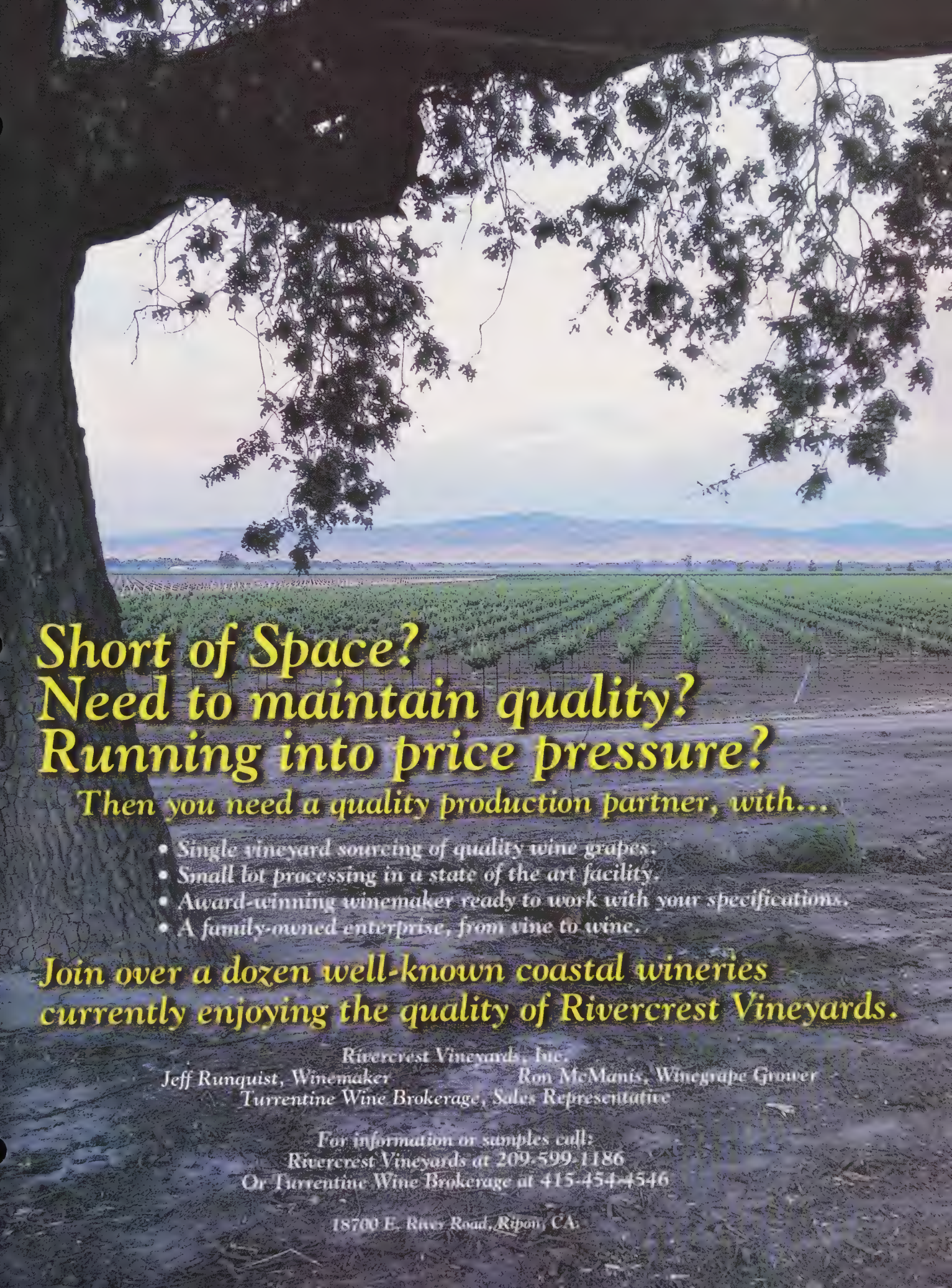
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Conclusions

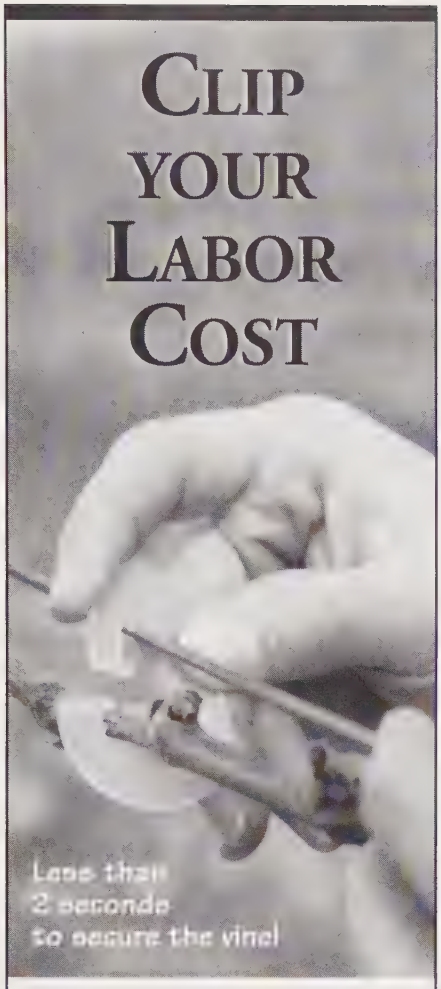
As vine density increased, there were decreases in per-vine values for both canopy and crop size. There were also significant decreases in individual shoot weight, cluster weight, and number of berries per cluster values. The consistently smaller and looser cluster size associated with closer vine spacing, particularly in the meter-by-meter, implies that root competition for water and/or nutrients occurs early enough in the season to affect berry set. Smaller cluster size can be desirable, depending on the site, variety, clone, and wine style for which the grapes are intended.

Seven-year averages showed very similar per acre yields from the two closest vine spacings, 1 x 1 and 1 x 1.8 meters. Both yielded over one ton per acre more than the 1.5 x 2.7 meter spacing on the same trellis system. The Lyre trellis treatment has averaged similar yield to the two closer spacing treatments, but to date has not fully filled out its cordons.

Within the same vine spacing of 1.5 x 2.7 meters, adding shoots and clusters via a quadrilateral cordon Lyre trellis system resulted in consistently lower cluster weight and shoot weight compared to a bilateral cordon, single vertical trellis. The wines were found to be significantly different from each other in only one vintage, however.

Wine "quality" conclusions are difficult to make, and blind comparison tastings did not always show significant differences. The preferred Cabernet Sauvignon wine style at this site has tended to come from a combination of factors, rather than one particular parameter of measurement. These include small cluster size, low to moderate shoot vigor and crop weight per vine, a fairly low crop-weight to pruning-weight ratio, and limiting maximum per acre yields. ■

Edited from presentation to ASEV Vine Spacing Symposium, June 29, 1999



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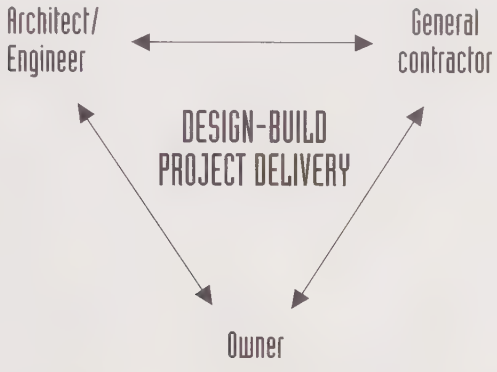

BY Susan Diane

AS the demand for wine grows steadily and new vineyards are maturing, many wineries are expanding existing facilities or building new ones. For most winery operations, there is a critical window when harvest activities cannot be interrupted. This is just one reason why winery owners may want to consider the design-build project delivery system.

Design-build offers a phased approach to the construction schedule that makes it possible to build winery facilities on a fast track with minimal risk.

Just as the axiom *business is relationship* drives successful players in the wine industry, good working relationships are also critical in the construction field. Recent research at Pennsylvania State University into what makes a construction project successful shows that the project team's joint commitment to resolving conflict and each team member's ability to communicate are key. The design-build approach emphasizes relationship building between the owner, the designing architect and engineers, the general contractor, and all of the subcontractors by putting them and suppliers on the same team right from the start.

Before the design concept is more than 20% complete, the team is selected and develops the project together, each offering his/her expertise as the drawings are prepared. This method minimizes the conflicts and misunderstandings that too often get in the way of building a facility on time, within budget, and up to the quality standards required.

Traditional design-bid-build

Design-build is a different process from the previous standard method of handling a construction project called design-bid-build. In the design-bid-build scenario, the owner hires an architect to design a new building and produce a complete set of drawings for construction. The construction drawings can require a year or more to produce. Once the drawings are done, the owner requests bids from several general contractors who determine the cost and time frame to construct according to the drawings. Typically, the owner will award the job to the contractor with the lowest price to build the project.

At the root of difficulties under the design-bid-build method is the fact that it doesn't allow for communication between the players until the design work is complete and construction is scheduled.

Based on his expertise and experience, a good contractor will offer suggestions about more efficient construction or less expensive materials once he sees the design, but the plans are already complete. Design-bid-build virtually eliminates the possibility of taking advantage of the cost or time savings offered by incorporating the contractor's viewpoint. If the owner does approve the contractor's suggestions, the architect must redesign the project to incorporate them. This costs the owner more money in redesign services and delays the start of construction.

Although the general contractor will make a bid proposal based on his best assessment of the drawings, invariably with the design-bid-build approach, some details will be overlooked and left out of the bid. As a result, during construction, the general contractor may have to amend the bid, to charge the client more or make up for a potential loss by cutting the quality of one or more of the materials originally specified for the project.

In the design-bid-build approach, the architect is expected to provide information throughout the course of construction to the general contractor as questions about the drawings arise. Also, if the architect detects that the contractor is using a material that is different from what was specified, he reports that to the owner, who is responsible for addressing the cost/ quality change with the general contractor.

Overall, this system is time-consuming and fosters adversarial relationships between the architect, engineers, general contractor, and subcontractors; it also makes the owner responsible for all communications, including conflict resolution.

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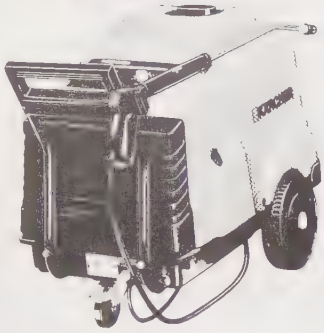

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Design-build project delivery system

Design-build is a more efficient system for several reasons. Rather than waiting for the entire set of construction drawings to be completed, a project moves forward in phases, so the work can be overlapped. For example, a site-work contractor can begin excavation before the electrical drawings are completed. The project can get started earlier and be managed on a fast-track schedule for each construction phase. The design-build firm, which could be the architect/engineering firm or the general contractor, is assigned the lead on the project; it offers a single point of responsibility and is ultimately responsible for the entire job.

Contractors and subcontractors can provide "value engineering" suggestions during the design phase, saving both time and money. For example, a subcontractor may notice a construction detail that can be accomplished in a more efficient way, so the change is made on the drawing board rather than in the field where it can be expensive or never made at all.

"Value engineering is the process of optimizing the various elements of a building project," explains Alan Carlton, owner of Carlton Engineering (Shingle Springs, CA). "It gives the designer and builder the opportunity to price a number of construction methods in order to achieve the desired end product for the lowest cost. Of course, lowest cost must take into account a number of criteria including appearance, ease of construction and sequencing, lifecycle, and engineering performance."

In the design-build scenario, because the owner is relieved of negotiating costly changes during construction, the risk factor is reduced. "If I am a part of the project from the design phase, I'll guarantee my price and take responsibility for any cost differences," says Craig W. Wilson, director of new development at Earl Construction. The West Sacramento, CA, design-build firm was the general contractor for recent expansions at Ferrari-Carano Winery in Healdsburg, CA, and at the R.H. Phillips Vineyard in Esparto, CA.

"There is no adversarial position between the architect and the general contractor in a design-build system," adds Carlton. "The owner puts the budget on the table, everything is out in the open, and we talk about what things will cost while we create the design, so there are no surprises at the end."

Recent research supports team approach

Mark Konchar, post-doctoral research scholar in Architectural Engineering at Penn State University, studied 351 construction projects recently completed in the U.S. and co-authored a book with Victor Sanvido of Penn State that compares three approaches to a construction project, including design-build. "When investigating project cost growth, the characteristic that appeared most often on top performing jobs and least frequently on poor performing jobs was communication and including construction team members in the process before 20% of the design is complete," he reports in *Selecting Project Delivery Systems,* (the Project Delivery Institute, March 1999; authors can be contacted by e-mail at: mkonchar@ccgmail.com).

"Primary results showed that, on average, regardless of facility type, contracts used, or experience of team members, the *unit cost* of design-build projects was 6.1% less than design- bid-build," says Konchar. "Design-build projects were 12% faster in terms of *construction speed*, and 33.5% faster in terms of *delivery speed* (time from design start date through construction) than design-bid-build projects.

According to *Selecting Project Delivery Systems,* there are seven critical decisions that an owner must make in building a new facility, one being the choice of a project delivery system. These decisions are interrelated and cannot be made independently.

1. What are the business goals of the facility?

2. What are the owner's organizational constraints, culture, strengths, and weaknesses? What will the owner's role be? (Determined by involvement with concurrent projects, experience in construction, ability to staff a job, ability to assume risk, and the ability to make decisions.)

3. Based on cost, schedule, and quality, will the method be design-build or design-bid-build?

4. Which method of procurement will be used, and what strategy will govern selection of team members? Will choices be qualification-based, defined by the scope of work, or determined by the proposed solutions to challenges?

5. Who will be on the project team? Consider:

- Commitment of each team member organization's key staff people dedicated full-time and long-term
- History of relationship between owner and team members
- Credentials of individuals
- Financial strength of team members or firms
- Experience with facility type
- Ability to meet government requirements
- References from similar projects
- Cost, schedule, quality, and service performance promised
- Litigation reputation
- Safety performance
- Backlog of other work

6. What will terms of the contract be? Includes scope of work, financial terms and commitments, time frame for construction, risk allocation, and mechanisms for resolving conditions that differ from those envisioned.

7. What will the facility program be? Includes functional criteria, goals, and requirements. The facility program describes the functional criteria for the facility — those things the winery needs or the owner desires to effectively conduct its business or provide the intended services and products. Many times the owner has developed the facility program. Often, however, the owner simply has preliminary information and engages a team to define or to at least confirm the program.

Typical design-build contract

Design-build offers the owner a single point of responsibility (one contract) for project design, government permitting, and construction. A collaborative relationship between the architect/engineer and builder working toward a common goal is established. Suggestions for value engineering are invited from the beginning. Construction is phased and begins while the project design is still being completed.

The owner may begin the process with an architect/engineer or with a general contractor. "Every owner, project, or situation is different, so we build the project team based on the needs of the client," explains Wilson. However the project begins, Wilson believes the general contractor should take the lead. "The contractor has the ultimate and final responsibility for the job and has the most at risk. He has the deepest pockets and is the only one who can guarantee cost and completion time, and thus should take the lead."

Design-build services may begin with pre-design coordination of government agencies, surveys of existing facilities, marketing studies, and economic feasibility reports. Analysis of the building site involves utility studies on and off site, environmental reports, and zoning requirements. The project schematic is evaluated in terms of architectural, structural, mechanical, electrical, civil, landscape, and interior designs. Documents are checked and materials specifications are researched. At this point, a statement of probable construction cost can be proposed.

The bid process and bid negotiations are an on-going part of the project, including analysis of alternates or substitutions. Bid evaluation is a team effort to produce construction contract agreements. On the site, field observation and coordination of inspections are a part of monitoring the schedule. Supplemental documents are provided in a timely manner and change orders are accounted for.

By assuming accountability for design and construction, the design-build firm, whether it's the architect/ engineer or the general contractor, acts as mediator for any disputes. Lines of communication are simplified and reduce the chances for misunderstandings that translate to increases in expenditures, thus reducing the risk to the owner.

After the building is complete, the design-build firm may be available for start-up assistance, including maintenance and operational programming of the new facility. Record drawings are provided and warranty reviews are conducted.

"The design-build process allows the owner to focus on his main goal of making wine," says Wilson, "and allows the design-build firm to focus on meeting the owner's expectations within budget on schedule." ■

Craig W. Wilson will be teaching a class on design-build offered through UC Davis University Extension; it will be based on the research and studies from Penn State University. For more information, call 916/371-4100.

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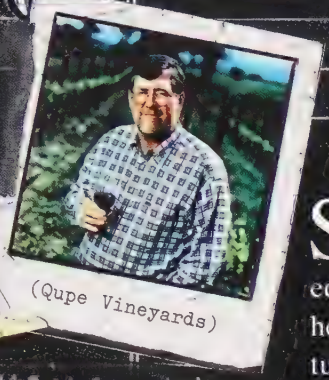


(Qupe Vineyards)

CHAPTER ONE. *We All Start Somewhere.*

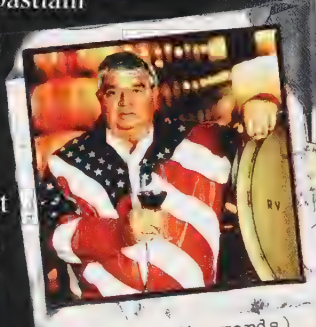
Santa Barbara County. 1975. Trading weeks of labor for a few precious hours on borrowed equipment, Bob Lindquist dreams of having a winery he can call his own. Starting with just $35,000, he turns (*con't at www.svb.com/qupe*)

(Hedges Cellars)

Their first vintage is a smash in Sweden. After quickly selling 4,000 cases, the alcohol monopoly Vin & Spritcentralen orders 12,000 more. Hedges Cellars expands into other markets, finding success wherever they go. The only question now is (*con't at www.svb.com/hedges*)

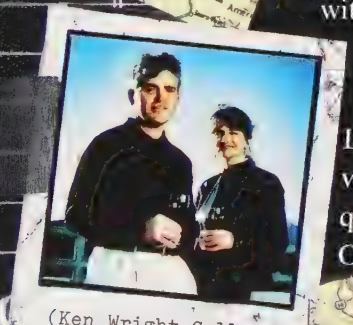
(Viansa Winery)

The view is breathtaking. Standing on top of a hill overlooking the lush Sonoma valley, Sam and Vicki Sebastiani raise their glasses for a toast, admiring the land on which they will build their dream. It might not be Tuscany, but (*con't at www.svb.com/viansa*)



(Rombauer Vineyards)

Sometimes family legacies are so deeply engrained, they are fulfilled subconsciously, almost without effort. Fate has a funny way of doing that to people. Take Koerner Rombauer. A pilot from (*con't at www.svb.com/rombauer*)



(Ken Wright Cellars)

Lexington, Kentucky is a long, long way from the Willamette valley. But for Ken Wright, that's where it all begins. Waiting tables at the quaint Fig Tree restaurant, he develops an insatiable curiosity for wine. One that will lead him from the bluegrass (*con't at www.svb.com/wright*)

CHAPTER TWO. *The Journey Continues. (on the web sites above.)*

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Intense flavors characterize Syrah/Shiraz

Syrah in Red Willow Vineyard, Yakima Valley, Washington

BY Eleanor & Ray Heald • Contributing Editors

Syrah in California and Washington can be an explosively fruit-forward wine with obvious blackberry and blueberry aromas, backed by pepper characters, layers of flavor complexity, full body, and round, integrated tannins. Grown in warmer climates, it has stylish, gamy complexity. Whichever its style or blend of both, Syrah has come of age on the West Coast.

In the early 1970s, Gary Eberle (Eberle Winery, Paso Robles, CA) was a man before his time with plantings (Chapoutier clone) of Syrah during his tenure at Estrella River Winery (now Meridian Vineyards). These plantings gave rise to the Estrella River clonal selection of Syrah, now widely planted in California.

In 1974, Joseph Phelps Vineyards (St. Helena, CA) made the first California-produced Syrah, sourced from a seven-acre plot (unidentified clone) planted in the 1950s by Christian Brothers Winery in Napa Valley.

Today, Syrah is grown in several West Coast wine regions. Yet, it is frequently associated with producers on California's Central Coast, because there, a band of Rhône-wine aficionados are striving to educate consumers about Syrah and a host of other Rhône varietals.

PWV interviewed producers from California and Washington state to get their cutting-edge views on the optimum farming methods for Syrah. They discussed important cellar techniques, including rotary and static fermentors, choice of blending varietals, impact of American and French oak, and labeling Syrah or Shiraz as a style statement.

They agree that controlling vigor is Syrah's major viticultural challenge. When vine vigor is controlled, the wine's lush fruit, supported by a framework of resolved tannins, delivers great flavor intensity.

Warm versus cool sites

Which Syrah character is expressed depends on where it's grown. Kevin Hamel notes that in a warmer climate, such as Preston Vineyards (Healdsburg, CA) in northern Dry Creek Valley, earthy, leathery, meaty, and smoky flavors are overlaid on the core of black fruits.

In a cooler region, such as the Russian River Valley AVA just south of Healdsburg where Hamel sources his own label Syrah, the fruit has more red and black fruit qualities.

Hamel also notes a green end of the Syrah spectrum, which is neither inappropriate nor in anyway negative. In cooler years, he says, even usually warmer sites can have an intriguing herbalness.

Cline Cellars (Sonoma, CA) is one of the few producers growing Syrah in the cool-climate Carneros region. There, Syrah develops berry and dark plum flavors with peppery notes; Don Reha agrees that warmer-climate growing areas, such as Contra Costa County where Cline sources some Syrah, produce meaty, gamy, and smoked bacon characteristics.

David Lake (Columbia Winery, Woodinville, WA) adds that cool-climate Syrah has a black pepper quality. He speculates that all red varieties grown on the edge of where they can successfully ripen may tend to have this character. He judges that this is the case with Syrah in France's northern and southern Rhône. In a warmer year, he notes, even J. L. Chave's Hermitage south- and southwest-exposure vineyards in the northern Rhône lack a peppery component.

Sarah Gott counters that Joseph Phelps Vineyards would like to have more spice qualities in its Syrah. Like the winery's Viognier vineyards, the Syrah vineyards are in upper and lower Napa Valley sites, though the grapes grown in the Carneros exhibit distinct pepper. Phelps recently planted Syrah in the Monterey area in the hope that it will have more of the spice and pepper characters.

Philip Staley's cooler vineyards in southern Dry Creek Valley produce cherry, blackberry, and some chocolate flavors with minor levels of pepper.

Kendall-Jackson sources Syrah from several California regions. Ron Bunnell explains that the Vintner's Reserve Syrah is sourced from Sonoma, Mendocino, Santa Barbara, and warm Paso Robles vineyards. The style emphasizes ripe, wild fruit, cherries, raspberry, and peppery/spicy tones.

Sourcing decisions

R. H. Phillips Syrah is grown in the very warm Dunnigan Hills AVA. In the first six to eight months after vintage, it shows abundant red berry and raspberry fruit, but Barry Bergman reports that as the wine ages, bright fruit aspects drop out and leathery, meaty, earthy characters come forward. Therefore, for a fruit lift, Syrah is blended, pre-bottling, with approximately 5% to 10% Cabernet Sauvignon from Mendocino County or Dunnigan Hills.

Nick Goldschmidt (Simi Winery, Healdsburg, CA) likes a combination of vineyard locations stating that warm locations are preferred for the winery's Shiraz, highlighting soft berry fruit, but with some white and black pepper in the background. To augment this, Simi planted Syrah in Alexander Valley benchland sites but is currently sourcing from one Alexander Valley and one Dry Creek Valley vineyard.

For its 1997 Syrah, Beckmen Vineyards (Los Olivos, CA) sourced grapes from three Santa Barbara County vineyards, where the cool climate produces grapes with flavors of plum and blackberry with hints of white pepper, spice, and tobacco. The wine is a blend of 50% Stolpman Vineyard in Santa Ynez Valley, 40% Thompson Vineyard in Los Alamos Valley, and 10% estate vineyard in Santa Ynez Valley.

"Our estate vineyard was planted in 1996 with green time-saver vines (no longer available); the rootstock was grown for a full season at the nursery prior to being grafted to the Estrella River clonal selection and grown for another season. It was sold to us as a green vine the following spring," explains Beckmen. "This was more expensive for us and the nursery, but we got a more developed root system that enabled us to train the vines up the stake in their first season and harvest in the second season (1997). The yield was only 0.65 tons per acre, but very balanced considering the age of the vines."

Stolpman Vineyard was planted in the early 1990s to both the Estrella and Durrell clonal selections. "Bud break on the Estrella selection is one or two weeks before the Durrell selection and generally that carries on through harvest when the Estrella is picked one or two weeks before Durrell," reports Beckmen. "Harvest decisions are based mostly on flavor, ripeness, and Brix, but also pH and TA. We like to pick Syrah around 25° Brix.

Chris Munsell notes that the focus at Geyser Peak (Geyserville, CA) is on the grape variety, and the winery is searching the length and breadth of California sourcing fruit. He agrees that cooler sites tend to showcase black pepper and allspice, but he suggests that those

PARTICIPATING PRODUCERS:

☆ Steve Beckmen, winemaker
Beckmen Vineyards, Los Olivos, CA

☆ Don Reha, assistant winemaker
Cline Cellars, Sonoma, CA

☆ David Lake, M.W., winemaker
Columbia Winery, Woodinville, WA

☆ Chris Munsell, assistant winemaker
Geyser Peak Winery, Geyserville, CA

☆ Sarah Gott, assistant winemaker
Joseph Phelps Vineyards, St. Helena, CA

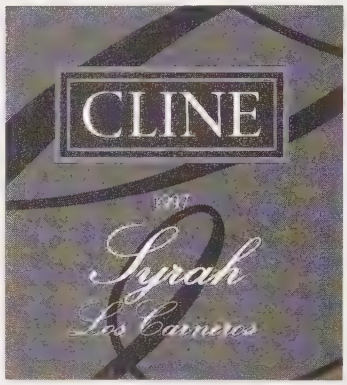
☆ Ron Bunnell, winemaker
Kendall-Jackson, Geyserville, CA

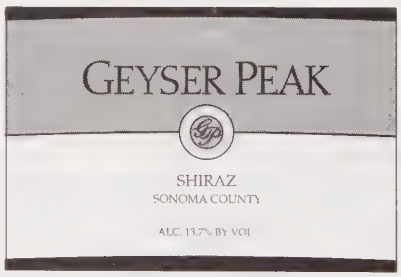
☆ Barry Bergman, winemaker
R.H. Phillips Vineyard, Esparto, CA

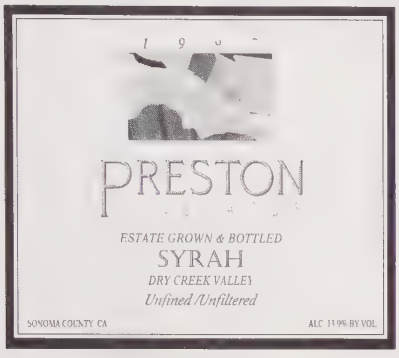
☆ Kevin Hamel, winemaker
Preston Vineyards, Healdsburg, CA

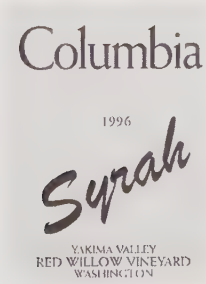
☆ Nick Goldschmidt, winemaker
Simi Winery, Healdsburg, CA

☆ Philip Staley, winemaker
Staley Vineyard & Winery, Healdsburg, CA









characters are not necessarily what a winery might like in the wine as a sole component.

At Geyser Peak, grapes with peppery characters are used as blending tools. Munsell reports that one Mendocino County vineyard about 10 miles inland from the coast, for example, has virtually no fruit qualities and is all peppercorn, but it makes an interesting blending component. Geyser Peak sources warm-climate fruit from Cloverdale, Geyserville, and Alexander Valley for a Sonoma County bottling.

Stylistically, the Sonoma County and reserve Geyser Peak Shiraz bottlings are different. The reserve showcases rich, black fruit characters, while the regular carries more spicy aspects. "Having vineyard sources in cooler climates allows us to make the stylistic difference," explains Munsell.

Columbia Winery also bottles a Yakima Valley and Red Willow Vineyard Syrah. Lake explains the difference as partly vine age and partly *terroir,* due to six different Red Willow Vineyard parcels with different soil profiles (owned and managed by Michael Sauer). The regular bottling is made from younger vines planted in 1993, and the reserve, with greater depth and flavor layers, is from older vines planted in 1986.

Red Willow Vineyard eastern slope blocks have faint hints of vegetative characters, although the main attribute is bright berry, a nice element in the blend. West-facing slopes (35% grade) yield the most interesting ripe fruit.

Soil is key

Because of Syrah's overt vigor and tendency to overcrop, Goldschmidt would rather have it planted on free-draining slopes, thinner soils with an open canopy. "Soil and topography are the key to great Shiraz," he maintains.

Beckmen believes soil is the key to great Syrah also. "All of the Syrah grapes we use are very good, but our finest Syrah comes from the shallow, hillside, limestone soils of Stolpman Vineyard. The soil helps to devigorate the vine and create a better balance between canopy and fruit. It also seems to intensify the varietal fruit character. Soil was a main criteria for us in developing our new Syrah vineyard, Purisima Mountain, on the same soil series adjacent to the Stolpman Vineyard."

Even though Preston has all its Syrah planted within a stone's throw of the winery, there are three distinct soil types. Syrah behaves very differently in each. On the gravely and well-drained parcels, grapes ripen early with physiological ripeness at 22.5° Brix. Fruit characters are delicate with some herbal notes, yet elegant overall.

A dry, eroded terrace produces Preston's best Syrah. Grapes are also planted on classic red clay of decomposed granite. These grapes offer a middle-ground of red fruit characters in a precocious wine, but they don't have the depth of black fruit produced by the eroded terrace.

Goldschmidt dismisses a theory that suggests lower sugars at picking create a wine with more spice; he believes spice characters have more to do with hang time. With between 115 and 120 days from set to harvest, Syrah yields more spice. But if the hang time is 140 to 145 days, there will be more ripe fruit characters.

Vineyard essentials

At its home vineyard in Geyserville (a very warm site), Geyser Peak has its Shiraz on Geneva Double Curtain (GDC) trellising, and Munsell says, "The fruit just cooks. We get significant burnt fruit, and we have to double pick to make GDC work in our favor. GDC works in cool climates to battle herbaceous, overtly spicy characters.

"In deciding on a trellis, it's important not only to look at soil and its relation to vine vigor, but to consider the impact of the sun at very warm locations."

R. H. Phillips has 220 acres of Syrah planted, and Bergman maintains that Vertical Shoot Position (VSP) trellising works well for the warm Dunnigan Hills region. "The valley floor has a lot of Class 1 soils, which are very vigorous," he reports. "We have some older Syrah plantings there that are a jungle. On the hills, where soils are heavy clay loam yet much shallower, vigor can be controlled with VSP, and good light penetration is possible.

"As long as soil quality is the primary focus for choice, any shoot-positioned trellising system works with Syrah on a devigorating rootstock. At R.H. Phillips that's 110-R."

Lake suggests that the longer he stud-

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ies dehydration of Syrah, the more he considers it desirable. There was the worry that dehydration would give fruit a raisiny flavor, but he does not witness this with Syrah. At Red Willow Vineyard, drip irrigation prevents excessive dehydration and exaggerated shriveling of berries.

Beckmen agrees that a certain amount of dehydration is good, adding more complexity of flavor and texture to the finished wine.

Irrigation is continued late into the season to get hangtime at R.H. Phillips. "Otherwise," Bergman explains, "sugars would be at 26° Brix with immaturely flavored fruit. We get shrivel with Syrah that would make Napa Valley Cabernet Sauvignon growers have a heart attack. We've come to understand that, in warmer climates, berry shrivel in Syrah is good."

Staley has Syrah on 5C rootstock in thin, rocky soils. "If vines aren't irrigated at five gallons per week starting in August, excessive shrivel will be noticed between 21° and 21.5° Brix," he reports.

Cropping and flavors

Due to Syrah's aggressive growth habits on some sites, leaf removal can be essential to getting more sunlight on the fruit. Without attention, canopies can become outrageous in size, even on devigorating rootstock. Minimal management includes dropping bunches at veraison and another vineyard pass to drop double clusters post-veraison.

A reasonable crop is 18 pounds per vine or four to five tons per acre (TPA), with wide tractor-row spacing and 506 vines per acre, but growers indicate that the vine could crop twice that much if not properly managed.

Reha, however, suggests that around 10 pounds per vine is a better target. Cline crews go through the vineyard three times to thin bunches.

Hamel's choice is 8 to 10 pounds per vine with 900 vines per acre; he adds that the vines are quite self-regulating with loose clusters. A few vineyard spots need grooming, but overall, significant thinning is not needed.

Staley has the Durrell clonal selection planted on 5C rootstock. It is not thinned. After veraison, clusters that are lagging are dropped. On average, yields are 3 to 3.5 TPA. Vines have significant vegetative growth but do not crop heavily.

Beckmen purchases the Durrell selection grapes from the Stolpman Vineyard planted on 5C rootstock, which will produce 5 to 6 TPA without crop thinning. "Our goal is 3.5 TPA," states Beckmen.

Columbia Winery sources Syrah exclusively from the Red Willow Vineyard in Yakmia Valley. Own-rooted vines, with an average age of nine years, yield 10 pounds per vine. The vines are spaced 6x10, primarily trained on a bilateral cordon with a 12-inch T. Two blocks with heavier canopies were retrofitted to Smart-Dyson in 1997 and 1998 to improve light penetration.

Vine manipulations on the T-trellis include leaf stripping in some years, shoot thinning, hedging, and crop thinning. Michael Sauer is hopeful that the new Smart-Dyson training will lessen

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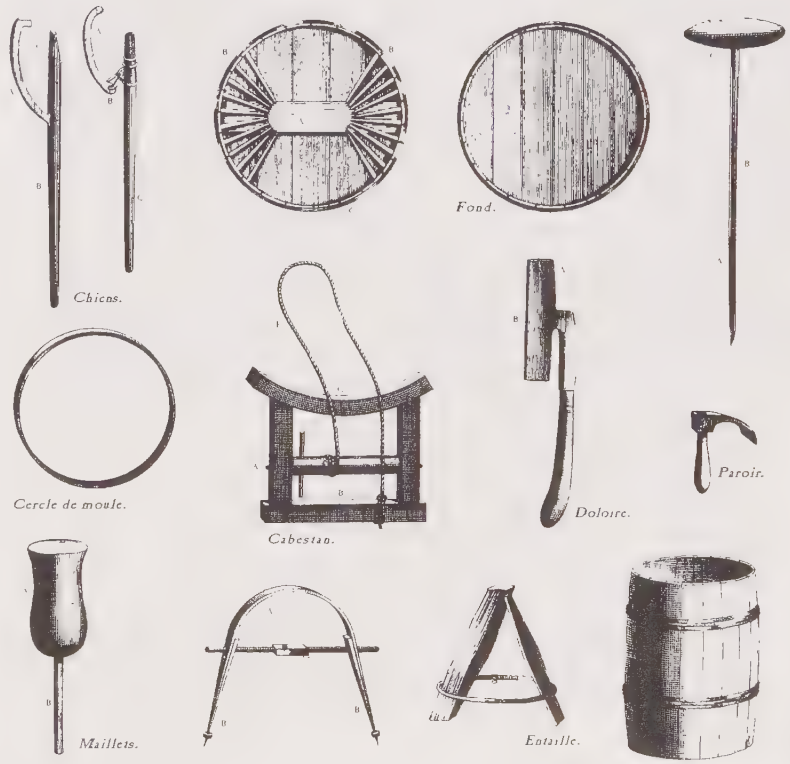

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the need for canopy manipulation. His assessment, after two years, is that the vines appear significantly more balanced and a lot less bushy.

Harvest parameters

Brown seeds in berries are a primary clue to Syrah's maturity. Grapes harvested earlier can develop aggressive tannins in the wine.

Munsell likes to see color from the grapes that he samples coming off on his hands and notes that when juice is spit, it should be quite red.

"There's a quality I've noted in Syrah that does not necessarily follow analytical parameters," Hamel explains. "If a grape sample is measured for acidity, it may indicate a TA of 0.60 to 0.65, but when it is not ripe, there can still be a tart quality to the fruit that can only be tasted. This tartness can be there even when the berries begin to dehydrate. TA is not a good picking indicator for Syrah."

Hamel reports that the pH in grapes from the warmer, northern Dry Creek Valley tends to be high, in the 3.6 to 3.7 range. In the Russian River Valley south of Healdsburg, he finds pH is generally under 3.4.

Beckmen believes the clonal selection affects harvest parameters. "Depending on the clone, pH can vary. For example, the Estrella selection is usually harvested at 3.4 to 3.5 pH, but the Durrell is usually around 3.65 pH."

Fruit handling

While Columbia Winery destems and crushes fruit, an estimated 15% to 20% whole berries enter the fermentor when rollers are pulled apart. That percentage adds a more significant element of berry fruit to the wine.

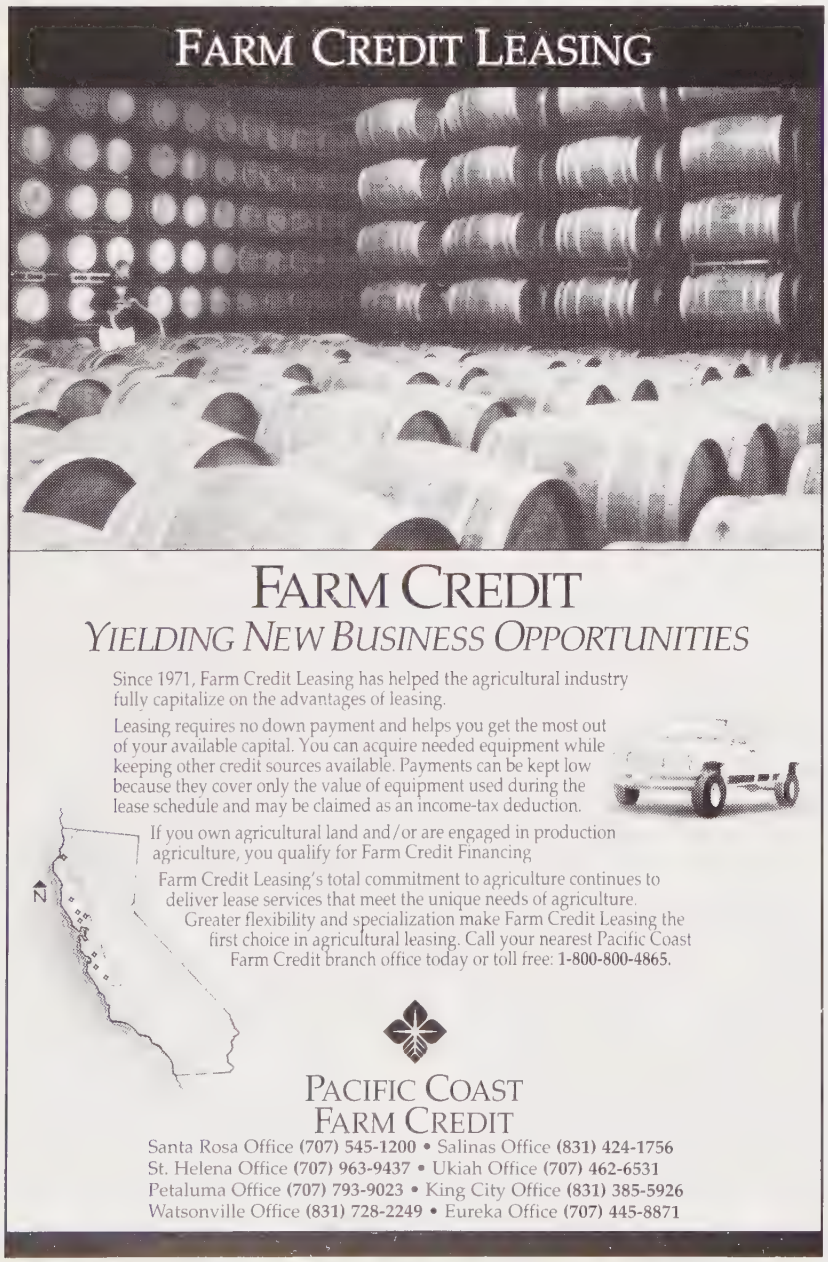
Of all red varieties, Syrah shows the most dramatic effect in terms of aromas and flavors, when a portion of whole clusters is retained. At Preston, half of the clusters are shoveled into the fermentor whole. "In the fermentor, uncrushed fruit smells entirely different, and these bright aromas and flavors transport to the wine," Hamel reports.

"The method of retaining some whole clusters is static carbonic and, tried with other red varieties, there is not the dramatic aromatic and flavor effect. But this technique mitigates the meaty, earthy characters that warm-climate Syrah develops.

"Because stems have not browned, we do static carbonic on only a fraction of the wine. But this is warm-climate fruit, and tannins tend to be much softer. Russian River Valley fruit tannins are much firmer (yielding perceptibly more astringent wine). With that fruit I want a high percentage of whole berries without stems. Therefore the fruit is destemmed but not crushed."

Space permitting at Geyser Peak, rotary fermentors (rotos) are used to the fullest extent possible. Findings are the same as those expressed by Hamel — warmer climate, softer tannins. Structure is there, but without astringent elements.

Geyser Peak ferments are worked hard early. For the first two to three days, the 24-hour rotational scheme is two to three rotations each direction every couple of hours. The cap does not build up substantially under this regime. At 10° to 12° Brix, the rotations are reduced to one or two each direction every three to four hours. By the fourth or fifth day, the wine is run off between 3° and 8° Brix.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In 1997, Simi used rotary fermentors for the first time. Goldschmidt reports that a couple of interns counted whole berries that passed through the destemmer/crusher without rollers, and their count was about 25%! While Simi ferments are cooler and not worked as hard as those at Geyser Peak, Goldschmidt suggests the important factor is to drain off at 8° Brix and transfer to new American oak barrels at a minimum of 5° Brix.

"The methods we choose make a style statement," Goldschmidt contends. "Barrel fermentation allows for faster integration of fruit and wood. This then allows for an earlier wine release. It emphasizes red fruit characters in the front of the mouth. That's why we and Geyser Peak label the wine Shiraz and not Syrah. The motherland is Australia, not France."

Lake recently experimented with partial barrel fermentation (pulling off a couple of barrels from a tank at 8° Brix). He notes that wine in both new barrels developed strong Bret while the parent lot was Bret-free. The same technique was applied to a lot of Cabernet Franc and the same phenomenon occurred.

Munsell responds by saying that Bret has not been a problem at Geyser Peak, but if there's any off character in Syrah it's H_2S. These winemakers suggest that adding DAP and/or Superfood at crush and racking up to three times before bottling knocks the H_2S back.

Lake recalls a Rhône varietal conference where it was suggested that the best cure for Bret discovered in barrel is to leave it alone — that it will self-cure. It was also noted at the conference that Syrah is best treated like Pinot Noir. Lake declared that neither suggestion has proved true at Columbia.

"I don't find the Syrah I work with needs to be treated like Pinot Noir," Hamel maintains. "I find that it benefits from some aeration, especially early on during maceration pumpovers and also for the first two rackings. Warmer-climate fruit tends to have more reduced character and needs more aggressive aerations shortly after fermentation."

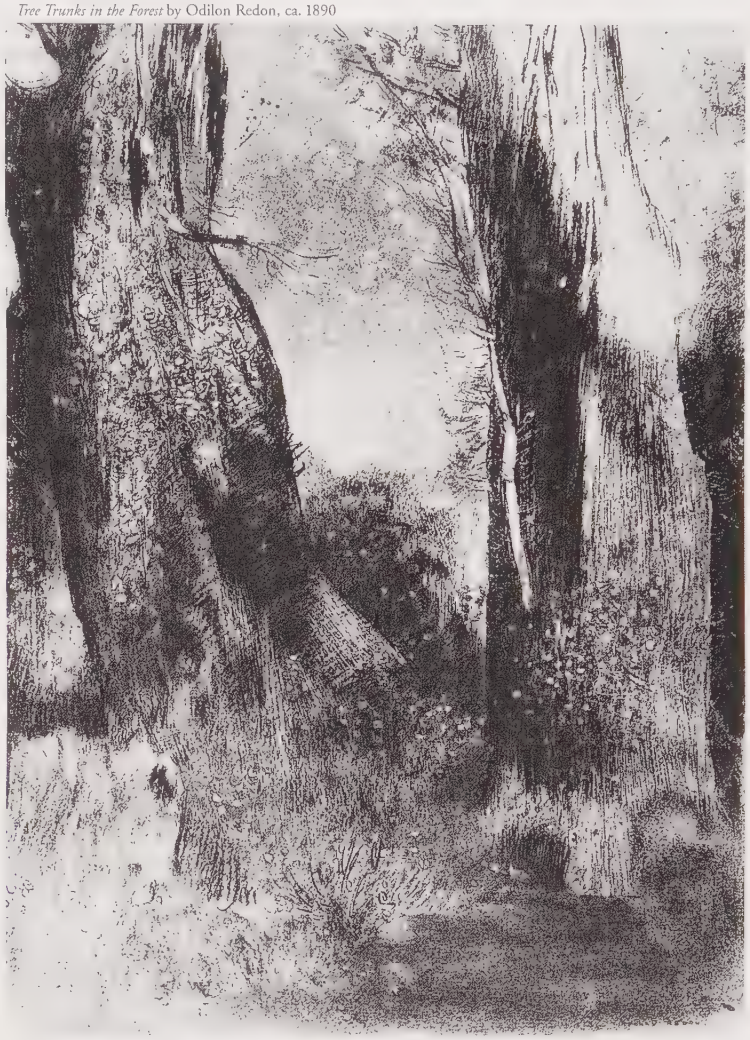
Munsell notes that there are three racking considerations: protected, unprotected, and aeration. He calls the Geyser Peak method unprotected, not actively splashing over a screen or into a sump and then back, but not gasing.

Other style issues

Steve Beckmen aims for a fruit-driven style and reports that, after harvesting, grapes are destemmed and slightly crushed, cold soaked for 48 to 72 hours and fermented 12 to 15 days in open-top fermentors with three punch downs daily. For the 1997 vintage, 25% of the wine finished primary fermentation in barrel — 25% new French oak, 75% neutral oak — and aged 12 months in the same combination. Malolactic fermentation (MLF) was completed in barrel spontaneously.

Kendall-Jackson uses principally crushed fruit with a small portion of whole berries. The cap is pumped over twice daily, for one minute per ton. "We're concentrating on fruit development and are going for more extracted

Tree Trunks in the Forest by Odilon Redon, ca. 1890



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wines occasionally utilizing extended maceration," Bunnell maintains.

Depending on the year, Joseph Phelps also chooses extended maceration for mouthfeel and maintaining a style. "In some years, certain vineyards require extended maceration to add complexity to the overall blend," Gott acknowledges. "We're aiming for a French-style wine."

Munsell points out that extended maceration is another difference between Syrah and Shiraz. "For Shiraz, extended maceration is not even a point of consideration," he affirms.

"We don't do extended maceration either," Lake adds. "But we would if it seemed necessary. Tannins are substantial, but not hard and harsh, so we normally press at dryness."

Malolactic fermentation

Goldschmidt explains that when Simi wine is drained from a rotary fermentor, it goes to a tank, is inoculated for MLF, and then goes straight to barrel.

Staley prefers to have MLF complete in an oak upright before transfer to barrel for ageing. At R.H. Phillips, MLF completes in tank and wine is transferred to barrel within two to three months post-harvest.

Lake normally inoculates for MLF in tank before the end of alcoholic fermentation, but transfers wine to barrel from the press and MLF completes in barrel.

Oak considerations

At Simi, Shiraz American style requires American oak. At Geyser Peak, all Shiraz is barreled in new American oak until time of blending (about four months). After that, wine is transferred to a "barrel maturation program" of half new and half used French oak barrels. Wine earmarked for the reserve bottling has a greater percentage of French oak ageing than the regular.

Beckmen has cut back use of American oak because of its strong dominating flavor. "We use French oak because we feel it integrates better with the fruit flavors. We want our Syrah to be an expression of the varietal and our appellation, we have solid fruit intensity and want that to stand out."

Lake chooses thin-staved Burgundy barrels (about 20% new). He has experimented with thick-stave Burgundy barrels and finds that Syrah evolves more swiftly in thinner-staved cooperage.

Reha concurs with the thin-stave concept, which provides more rapid wine oxidation. He notes that this treatment gives the appearance that wine aged longer, impacting style.

Both Joseph Phelps and Preston retain Syrah in barrel until June of its second year. Hamel notes that such wines, because of their gamier elements, need time in barrel to evolve and showcase fruit qualities.

Blending varietals

At Joseph Phelps, blending with Viognier is considered each year. Blending trials with up to 15% Viognier have been made, but Gott admits, "The winery has never included that percentage because it affects Syrah aromat-

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ics and texture adversely. It can take away from the varietal characteristics of Syrah."

Staley's blending decision is based on the effect on the nose of the wine; mouthfeel and flavor are lesser factors. He will use up to 2% Viognier or Grenache at up to 3%.

Bunnell says that Kendall-Jackson has considered Mourvèdre and Grenache as suitable blending varietals but so far has rejected blending in favor of 100% varietal Syrah.

Cline prefers 6% to 7% Mourvèdre, which Reha says fills out the midpalate.

Preston has typically bottled 100% Syrah, but in 1997, some of the more fruit-forward Syrah lots were blended with Mourvèdre and Cinsault. The idea was to have the wine Syrah-like, but in a different style. The Mourvèdre (at 12%) enhanced a cherry character lurking behind the gamier Syrah. Cinsault (at 13%) added floral and spicy notes.

"It would never cross Daryl Groom's (Geyser Peak senior winemaker) mind to blend a white wine with a red," Munsell comments. "It does not suit the 'Shiraz' style as it might for a Rhône blend.

"In the blending regime, we even get away from the Rhône varietals and choose Petite Sirah or Cabernet Sauvignon as opposed to Grenache or Cinsault, which have lighter fruit tones."

Goldschmidt never says never, but considers Cabernet Sauvignon the typical Australian blending addition. Currently, Simi Shiraz has a small (5%) percentage of Cabernet Sauvignon, which has been preferred over a number of blending trials.

Over the years Lake has had similar experience with Cabernet Sauvignon. Cabernet Sauvignon did not impact the wine in any positive way. But he has used Pinot Noir at 2% to 3% in a blending role. "The two mesh nicely together, and the wine opens up with more fruit in the aroma and offers the wine greater charm overall," Lake concludes.

Ultimate charm

Versatility is the ultimate charm of Syrah. Different techniques produce very good wine in a number of different styles. Currently, there is no style, no flavor consistency, no type of Syrah that could be said to characterize New World Syrah.

"Isn't that neat?" quips Goldschmidt.

Hamel hopes that, in a few more years, however, consumers will be able to get clues about the style of Syrah based on its region of origin.

"I think the winery will also be a clue to the style," Lake adds. "Obviously, wine made with partial barrel fermentation will have a different style than one pressed at dryness."

"The more specific the designation or vineyard source, then the more the wine's style is dictated," concludes Hamel. "If fruit is sourced from a broader area, then the chosen style can be achieved through blending and vinification decisions." ■

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VINEYARD EXPANSION

Complying with environmental regulations

BY Thomas E. Fraser
Wetlands Research Associates, Inc.

Grapegrowers who want to convert former agricultural, grazing, or other undeveloped land to vineyards must be proactive about dealing with three important environmental issues — jurisdictional wetlands, endangered species, and streambed alteration. All three are regulated by local, state, and federal resource agencies.

Each of these issues requires permitting that can delay vineyard development for months — and in some situations for years. It is imperative that growers schedule time for compliance with environmental regulations from the outset.

In California, for example, jurisdictional wetlands are administered by the U.S. Army Corps of Engineers (the Corps), under Section 404 of the Clean Water Act, and by the Regional Water Quality Control Board (RWQCB), under Section 401 of the Clean Water Act. Endangered species issues are regulated under the federal and state Endangered Species Acts by the U.S. Fish & Wildlife Service (USFWS) and the California Department of Fish & Game (CDFG) respectively.

Alteration of any creeks or streams during vineyard development will require obtaining a Section 1603 Streambed Alteration Agreement, which is administered by the CDFG. In addition, culverting, filling, or re-aligning creeks may also require permits from city or county flood control agencies, local public works departments, and in most situations, the Corps.

Jurisdictional wetlands

Jurisdictional wetlands are swamps, bogs, seasonal wetlands, and similar areas that fall under the jurisdiction of the Corps because they meet specific criteria of vegetation, soils, and hydrology established by regulation. In the western U.S., many wetlands are wet only during the rainy season and are not readily apparent at other times of the year.

Prior to planting vineyards, a grower should hire a qualified biologist or wetlands scientist to assess the property for potentially sensitive biological and wetland resources. If potential wetlands are located during this assessment, the grower will need to have this scientist conduct a jurisdictional-wetlands delineation on the property. A delineation study can take one to two months and confirms whether there are wetlands on the property and their location and size.

The report produced from a wetlands delineation study is submitted to the Corps of Engineers, and a Corps project manager is assigned to the project. Within two months, the project manager inspects the site and field-verifies the findings presented in the report. The project manager usually confirms what the wetlands consultant has found in the field, but there may be minor changes. If there are wetlands on the property and the grower plans to "fill" (includes grading or deep ripping) any of them for vineyard planting, a Corps permit is required.

The Corps permit usually needed for vineyard planting is Nationwide Permit 26 (NWP 26), which covers filling isolated wetlands or wetlands in headwaters. Obtaining a nationwide permit is at least a two- to four-month process, but can be longer if there are many different sensitive resources present on the site. The current version of NWP 26 expires in December 1999. The proposed permits that will replace NWP 26 are now undergoing extensive review.

Under NWP 26 a project cannot result in fill of more than three acres of wetlands or more than 500 total linear feet of creeks on an entire parcel. If adjacent parcels are later used for additional planting, the Corps will consider this new work as part of the same project. As part of the permit application, the grower must demonstrate that efforts have been made to minimize wetland impacts. There is almost always a compensatory mitigation requirement in the range of a two-to-one ratio of replacement acreage–to–filled wetlands.

If a grower plans to exceed either the three acres of wetland fill or 500 total linear feet of impacted creeks, he/she must apply for an Individual Permit from the Corps. Obtaining this permit can take nine to 12 months of processing time, working with the Corps and the RWQCB, as compared to two to four months for the nationwide permit process. The grower must also prepare an alternatives analysis that explains why grapes must be planted in these wetlands and why they couldn't be planted in some other nearby location. There is also a public notice component in the individual permit. Processing this permit requires a lot more agency time and more effort by the grower.

Concurrently with a Corps permit, the grower must obtain Section 401 Water Quality Certification from the RWQCB. This application includes much of the same information required in the Corps permit and the grower must pay a permit filing fee pro-rated for the amount of jurisdictional wetlands being filled.

Endangered species

Several federal- and state-listed threatened and endangered plant and

wildlife species are found in northern California's Napa and Sonoma counties. There are also "special status" species that aren't listed by federal or state agencies but are "candidates" for such listing or are "species of concern." Rare species found near vineyard areas in Sonoma and Napa counties include California tiger salamander, California red-legged frog, Northwestern pond turtle, Burke's goldfields, Sonoma sunshine, and Sebastopol meadowfoam.

If a biological assessment of the proposed vineyard determines that habitat for any of the above species is present, the grower may be required to conduct special surveys. Some wildlife survey protocols can take up to a year or longer because the survey must occur in both the dry and rainy seasons. Rare plants also have seasonal survey limitations; typically the survey must be conducted during the blooming time of target species.

Land in the Santa Rosa Plain in Sonoma County is subject to even stricter requirements for plant species. Burke's goldfields, Sonoma sunshine, and Sebastopol meadowfoam are found on the Santa Rosa Plain, and regulations require two years of plant surveys to confirm that they don't exist on a site.

These seasonal survey restrictions provide compelling reasons to plan ahead when developing a vineyard.

Streambed Alteration Agreement

In California, growers who alter creeks or streams during vineyard development must obtain a Section 1603 Streambed Alteration Agreement from the CDFG. A new version of this permit was issued in May 1999. Prior to that time, it was a one-page form; it is now a five-page form, covering more issues. The grower must obtain this permit if vineyard planting will involve filling, culverting, realigning, or otherwise altering a creek in any way.

The new version of this permit covers impacts on riparian vegetation, proposed bank stabilization efforts, rip-rap that's being put into the creeks, and related water quality issues. In the permit application, the grower must address endangered plants, wildlife, and potential habitat that may be present in the creek or adjacent to it. The application must identify other aquatic and terrestrial wildlife in the area. The grower must also list and provide copies of other permits that are being obtained for the overall project.

Take a proactive stance

To cope successfully with these environmental regulations, growers must be proactive and address the issues early. Plan for one to two years of lead time to allow for the survey requirements of certain rare species.

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process is to hire a qualified biologist to come out early in the planning stages to conduct a biological assessment of the proposed site. This assessment should take less than one day, unless it is a very large site. The biologist will tell the grower whether there may be habitat for any rare plant or animal species and whether there may be wetlands on the site.

Once the grower has this information, it is possible to predict whether additional studies will be needed and how much time these studies and permits might require. Having had this biological assessment conducted on the property before contacting regulatory agencies will provide the grower with answers to questions that agency personnel may have about biological resources on the property. ■

Tom Fraser is a plant and wetlands ecologist with Wetlands Research Associates, Inc., in San Rafael, CA (415/454-8868). Wetlands Research Associates has provided biological and wetlands consulting services for clients throughout California since 1981. From a presentation delivered in June to the 1999 Vineyard Economics Seminar.

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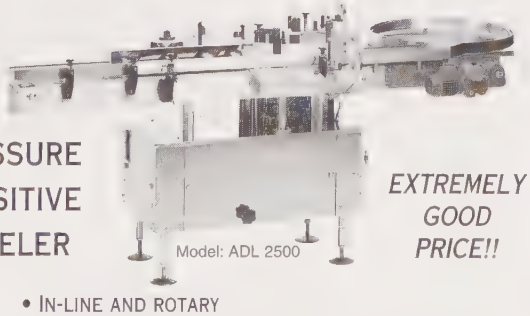

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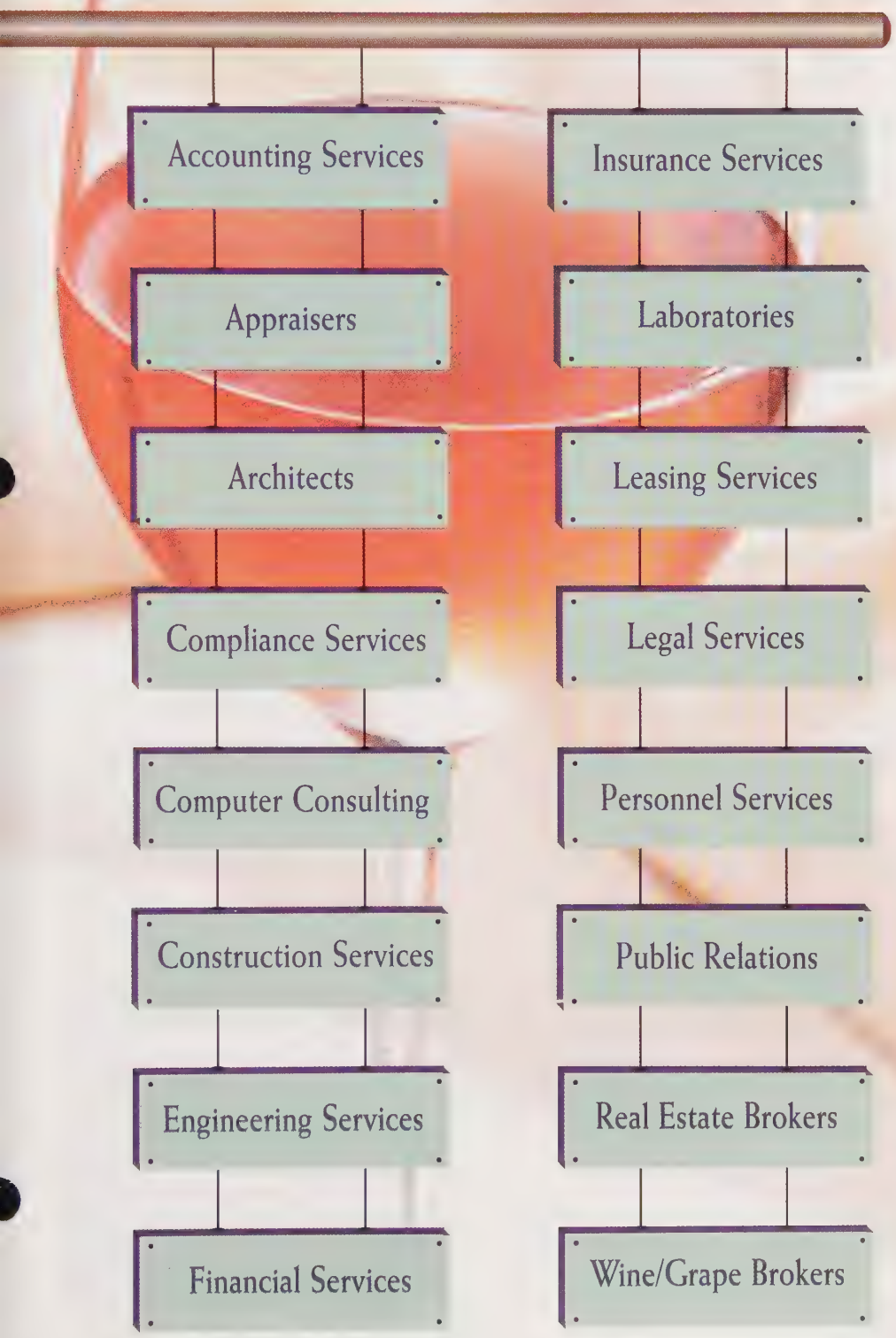

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The scope of their work includes projects as small as a 2,500 sq. ft. combination barrel cellar/tasting room to the 250,000 sq. ft. Clos du Bois Winery (Geyserville, CA). With their expertise in project management, they will oversee your project from conception to completion of construction bringing it in on time and in budget.

They transformed Whitehall Lane Winery, dubbed the "ugliest winery in Napa County," into a facility the owner is proud of. They have won awards for renovation of the historic Valley of the Moon Winery, not only creating a new barrel cellar and tasting room, but also making the facility economical and efficient with a new steel tank cellar, bottling and loading area, and a state of the art crush pad.

Mary and Dick's strength lies in their sense of design and ability to listen and communicate with clients. They can bring your ideas to realization.

For more information, contact:
ozborndooli ARCHITECTURE
Susan Ryan
822D College Ave., Santa Rosa, CA 95404
tel: 707/542-3770
website: ozborndooli.com
PLEASE SEE ozborndooli ARCHITECTURE AD, PAGE 52.

COMLEASE USA

Comlease USA has been in the equipment lease financing business for 19 years and enjoys a 3A1 Dun & Bradstreet rating. Over 60% of Comlease's volume is concentrated in the agriculture sector of commerce. Eleven years ago, Comlease USA contracted the services of Bill Volpa. Through his experience in the wine industry, Volpa has enabled Comlease USA to service wineries, their vendors, and row crop farmers with firsthand knowledge of their equipment needs.

Comlease USA is currently financing more than $20 million of new equipment leases per year. In-house operations are able to service small-ticket leases in addition to larger transactions. This expertise has allowed Comlease USA the opportunity to introduce the viticulture and enology areas of the wine industry to various financial institutions that had not worked with the wine industry before. Comlease USA is currently expanding its services to the Internet in order to better service its client base.

For more information, contact:
Comlease USA
Bill Volpa
6475 No. Palm, Ste. #105, Fresno, CA 93704
tel: 559/252-7300 or 800/767-0001
fax: 559/252-6200
e-mail: comlease@qnis.net

TURRENTINE WINE BROKERAGE

Turrentine Wine Brokerage offers the most efficient way to buy and sell grapes using the Turrentine Grape Exchange System. The company also serves the premium wine business with fast, effective sales of varietal wines in bulk, processing contracts, and pre-season juice contracts, win/win negotiations, comprehensive selection, over 20 years of experience, a U.C. Davis– trained winemaker, and a viticulturist on staff.

Ask about the *Turrentine Collateral Value Report* and inventory appraisal service and the acclaimed *Market Update* newsletter for in-depth market analysis.

For bulk wines for sale, bottled wine close-outs, and grapes available, check out: www.grapes-wine.com.

For more information, contact:
Turrentine Wine Brokerage
Steve Fredricks, Jim Cartan, Bill Turrentine
122 Tunstead Ave., San Anselmo, CA 94960
tel: 415/454-4546; fax: 415/454-9665
e-mail: info@grapes-wine.com
website: www.grapes-wine-com

CSA — COMPLIANCE SERVICE OF AMERICA, LLC

CSA offers the following services to the alcoholic beverage industry:

- BATF permits — full-service state and local alcoholic beverage licensing for producers, wholesalers, and retailers nationwide.
- Compliance consulting and education — specialized advice for start-ups, acquisitions, and alternating proprietors.
- Assistance with label design, trademarks, and trade names.
- Petitions for new or expanded viticultural areas.

For further information please contact:
CSA — Compliance Service of America, LLC
Dyana Nedra, Alex Heckathorn, Sara Schorske
PO Box 684, Wilbur, OR 97494
tel: 800/400-1353; fax: 541/672-3775
e-mail: csa@csa-compliance.com
website: www.csa-compliance.com
PLEASE SEE THE CSA AD, PAGE 27.

BRECKENRIDGE SOFTWARE TECHNOLOGIES, Inc.

Breckenridge Software Technologies, Inc., (BSTI) provides comprehensive winery management software and integrated accounting modules. You can choose the inventory module to track everything from grape receiving, bulk wine activities, and raw material and chemical tracking to blending, barrel management, winemaker notes, and case-goods tracking, or you can elect to implement a complete accounting system to optimize efficiency.

Other modules include Order Processing, Accounts Receivable, Accounts Payable, General Ledger, Payroll, Purchase Orders, and Vineyard Management.

Inventory items are tracked by product/varietal, lot, and location; lot and standard costing are supported; and cellar work orders can be created with full editing capabilities. Order

processing supports allocations, shipping documents, invoicing, club tracking, and interfaces with computerized POS terminals.

Many reports, with extensive selection criteria, are included with each module. Written in Microsoft® Access™, this easy-to-use, Windows-based software also permits you to produce custom reports.

BSTI software is designed for use on a single computer or multi-user networks. For larger network applications demanding top performance, a SQL-server version is also available. BSTI software is fully Y2K compliant.

Combining comprehensive BSTI software with quality manuals, training, and support will assure your success with an information system to help you manage your winery.

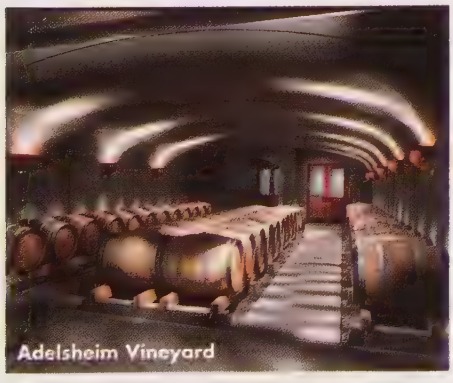
For more information, contact:
Breckenridge Software Technologies, Inc.
7855 S. Elizabeth Way, Littleton, CO 80122
tel: 303/267-0024; fax: 303/267-0026
website: www.BreckenridgeSoftTech.com

PLEASE SEE THE BRECKENRIDGE AD, PAGE 69.

LAURENCE FERAR & ASSOCIATES

Established in 1983, Laurence Ferar & Associates is committed to quality architectural and landscape design with a common sense approach to problem solving. To research winery design, Laurence Ferar has visited over 80 wineries in Oregon, California, France, and Italy to talk with winemakers about specific challenges and unique solutions.

Like winemaking, winery design is part art, part science, and part economics. Just as *terroir* lends character to wine, the unique sense of place inherent to each site is central to Ferar's approach. The firm designs buildings of lasting quality that complement their environment as well as clients' needs.


Adelsheim Vineyard

Recent winery projects include a 27,000 sq. ft. building for Adelsheim Vineyard; expansion of Lange Winery; master planning for Etude Wines; a 24,000 sq. ft. facility for Lemelson Vineyard; a new production building with barrel cellar for Leonetti Cellar; a 22,000 sq. ft. expansion of Canoe Ridge Vineyard Winery; and a new 20,000 sq. ft. facility at Pepper Bridge Vineyard.

Professional services include: site evaluation; master planning; integrated building and garden design; governmental approval assistance; historic restoration of structures and gardens; commercial kitchen design. The firm encourages your inquiries for small or large projects.

The professionals at Laurence Ferar & Associates not only have the expertise to carry out demanding assignments, they share your enthusiasm for winemaking success.

For more information, contact:
Laurence Ferar & Associates
1016 SW Clay St., Portland, OR 97201
tel: 503/241-5447; fax: 503/241-0826

DAL POGGETTO & Co. LLP, CPAS

Dal Poggetto & Company LLP specializes in accounting, tax, and consulting services for privately held businesses and their owners, with a particular emphasis in the wine industry. The firm's partners have been accountants and consultants since 1975 and have worked with companies of all sizes, from those with annual revenues under $50,000 to those with more than $500,000,000 in annual sales.

The firm's services include profit-improvement studies; strategic planning; financial modeling; transaction consulting for mergers, acquisitions, and divestitures; tax strategies and business planning; as well as traditional services such as auditing and accounting, tax planning and preparation, and accounting systems development and consulting.

The staff at Dal Poggetto & Company LLP have extensive wine industry experience and are frequently able to make cost and tax savings recommendations to clients. They have an excellent reputation for clear communication skills, technical abilities, and responsiveness to clients. The high quality of the firm's practice is maintained by a program of formal technical training for staff which greatly exceeds state licensure requirements and the programs of most other accounting firms. The most current technologies are employed to deliver client service in an efficient and cost-effective manner.

For excellent service at a competitive cost, provided by experienced professionals with broad consulting skills tailored to the needs of the wine industry, contact Dal Poggetto & Company LLP.

For more information, contact:
Dal Poggetto & Company LLP, CPAs
Jon P. Dal Poggetto, CPA
149 Stony Circle, Ste. 100
Santa Rosa, CA 95401
tel: 707/545-3311; fax: 707/525-3999
e-mail: info@dalpoggetto.com
website: dalpoggetto.com

PACIFIC COAST FARM CREDIT

Pacific Coast Farm Credit is a locally owned agricultural lending association that is part of the nationwide Farm Credit System established in 1917. Pacific Coast Farm Credit is a cooperative, owned and directed by its members. Because of the association's specialization in agricultural finance, it offers advantages to wine industry customers, including a commitment to agriculture, knowledge of the industry, tailor-made programs, local decision making, and competitive rates.

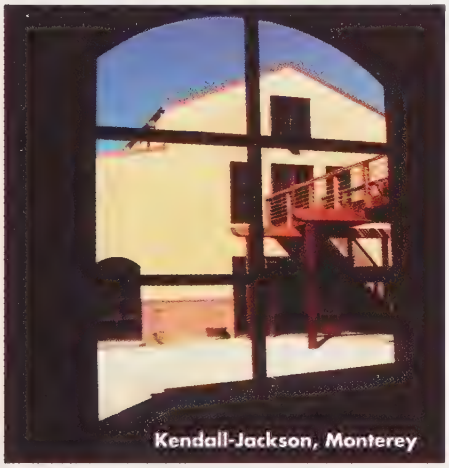
Understanding the special demands of the wine and vineyard industry, Pacific Coast has programs to finance virtually every aspect of your business. These programs include long-, intermediate-, and short-term financing and leasing programs.

For more information, contact:
Pacific Coast Farm Credit
PO Box 1120, Santa Rosa, CA 95402
tel: 707/545-1200; fax: 707/545-9400
website: www.agloan.com

PLEASE SEE THE FARM CREDIT AD, PAGE 50.

STEVEN D. PULTS, A.I.A., & ASSOCIATES

Founded in 1980, Pults & Associates provides a full range of professional architectural services and specializes in winery design. The firm's new, larger offices and expanded staff can provide a wide array of services for remodeling of existing facilities and start-up wineries. These services include feasibility studies, master planning, architectural design, preparation of construction documents, construction bidding and administration, and government agency processing.


Kendall-Jackson, Monterey

Professionals at Pults & Associates feel that buildings can be a distinctive tool in the winemaking process, and their designs are tailored to the stylistic winemaking approach of their clients. From small unique, boutique wineries to world-class production facilities, Pults & Associates responds to the client's desired image and statement of its facilities.

A partial project list includes Kendall-Jackson's Monterey and Cambria facilities, the Edna Valley Vineyard expansion, the Smith & Hook master plan, the Bailyana facility design, Fetzer Vineyards' Paso Robles facility, Robert Hall Winery, the Laetitia Vineyard & Winery master plan and expansion, and the Justin Vineyards & Winery master plan and barrel building.

For more information, contact:
Steven D. Pults, A.I.A., & Associates
Tim Mark Woodle, A.I.A.
3450 Broad St., Ste. 106
San Luis Obispo, CA 93401
tel: 805/541-5604; fax: 805/541-4371

HOYT SHEPSTON, INC.

Celebrating its sesquicentennial anniversary in the new millennium, Hoyt Shepston has provided the beverage industry with decades of international transportation experience for both the import and export of beverages and related beverage industry articles. Established in 1850, Hoyt Shepston is one of the nation's, and California's, oldest Custom House Brokers and Freight Forwarder/OTI offering the full range of international transportation-related services.

Whether shipping one case or a full container by air or sea, Hoyt Shepston's staff of professionals and worldwide network of agents moves the cargo with little or no effort on the part of the client, in increments or the total transportation concept, integrating all aspects of international trade from between warehouses.

Hoyt Shepston has the resources and expertise to bring products to and from its various international supply points in a seamless transaction. Hoyt Shepston specialists offer all phases of documentation services, insurance, label approvals, BATF, drawback procedures, duty and quota requirements, letters of credit and more, all backed by 150 years of experience. Yes, Hoyt Shepston is Y2K compliant.

Hoyt Shepston's headquarters and warehouse is located in South San Francisco with a branch office/marine division located on the Embarcadero in San Francisco, and a worldwide web of national and international agents.

For more information, contact:
Hoyt Shepston, Inc.
Fred Hosking
700 A. Dubuque Ave.
South San Francisco, CA 94080
tel: 800/675-HOYT (4698), ext. 311;
fax: 650/634-8067
e-mail: fhosking@ix.netcom.com

PLEASE SEE THE HOYT SHEPSTON AD, PAGE 42.

ZFA STRUCTURAL ENGINEERS

Are you choosing your winery design team members?

Whether you are modifying your existing structure or planning for a new facility, your structural engineer is critical to the success of your plan.

Trust ZFA Structural Engineers to provide you with superior consultation. ZFA's experience is the key. Headquartered in California's wine country, ZFA has been a winery structural engineering expert for the past quarter century. Based in Santa Rosa, ZFA has branch offices in San Francisco and Sacramento to better serve its growing and diversified list of satisfied clients.

ZFA's latest "vintages" include:

Guenoc Winery

- Guenoc Winery — Base isolation application to its Lake County facility, which provides high-tech seismic protection for two 20,000 gallon tanks.
- St. Francis Winery, Wild Oak Project (Kenwood, CA) — Huge expansion effort includes a state-of-the-art 86,000 sq. ft. production facility, a 68,000 sq. ft. barrel building, and a tasting room.

ZFA designs smart. Its engineers integrate vast structural experience with the latest developments and techniques, including environmentally (and economically) friendly materials and innovative seismic applications. ZFA Structural Engineers delivers all this with client-dedicated and cost-effective teamwork.

Why? Simply, ZFA's mission is to secure your most valuable commodity: Wine. After all, ZFA knows the wine business like nobody else in structural engineering.

For more information, contact:
ZFA Structural Engineers
Dennis Fagent
1212 Fourth Street, Suite Z
Santa Rosa, CA 95404
tel: 707/526-0992; fax: 707/526-0217
e-mail: dennisf@zfa.com
website: www.zfa.com

GOVERNMENT LIAISON SERVICES

Government Liaison Services (GLS) maintains one of the largest and most experienced staffs serving the wine industry. Since 1957, GLS has obtained BATF label approvals along with pursuing BATF rulings on formula submissions, lab analysis results, advertising, and many other BATF matters. GLS also specializes in performing Trademark, Patent, and Copyright search services.

For more information, contact:
Government Liaison Services, Inc.
3030 Clarendon Blvd., Ste 209
Arlington, VA 22201
tel: 800/642-6564 or 703/524-8200
outside U.S.; fax: 703/525-8451
website: www.trademarkinfo.com

PLEASE SEE THE GOVERNMENT LIAISON AD, PAGE 69.

THE PERSONNEL PERSPECTIVE

The management of your winery's human resources function can be challenging, exciting, frustrating, and overwhelming — all in the same day. Human resources management is one of America's fastest growing and most constantly changing fields.

The Personnel Perspective provides labor law compliance expertise including development of employee handbooks and key personnel policies, performance appraisal design, and compensation programs including incentive and reward systems.

The Personnel Perspective's training programs provide supervisors and managers with the tools needed to resolve personnel problems, expand communications and decision-making skills, and support their decisions with legal knowledge. This support is critical for winery managers who must work aggressively to achieve strategic goals, meet tight budgets, and ensure their employees meet high performance standards.

Through its flexible Recruiting Service, the firm offers either specialized search services or support service. The search service may include national recruitment from the wine industry. The support service includes advertising, screening, and personal interviews. Specializing in the wine industry ensures that The Personnel Perspective attracts the most highly qualified candidates.

Many clients take advantage of the new *Pathways* membership, which allows immediate and ongoing access to The Personnel Perspective's team of experts. Membership includes a telephone hotline, quarterly legal updates, annual on-site management training, admittance to quarterly, "Getting Down to Business" seminars, and an annual review of your employee handbook.

Realize the advantages of outsourcing one or all of your human resource functions. The Personnel Perspective can provide support on a project basis or retained service basis.

For more information, contact:
The Personnel Perspective
575 W. College Ave., Ste. 101A
Santa Rosa, CA 95401
tel: 707/576-7653; fax: 707/576-8190

DICKENSON, PEATMAN & FOGARTY

From its office in Napa, CA, Dickenson, Peatman & Fogarty (DP&F) serves the wine industry throughout the states of California, Washington, and Oregon and internationally. As the wine industry has grown, DP&F has grown from eight lawyers 20 years ago to more than 20 today.

Specific wine industry expertise includes debt and equity financing, alcohol beverage licensing, land use regulation, distributorship creation and termination, key-employee incentive plans, vineyard and real property purchase and leasing, and winery mergers and acquisitions.

DP&F
DICKENSON, PEATMAN & FOGARTY
A Professional Law Corporation

All members of the firm serve the wine industry in their particular specialties. For example, Richard Mendelson has served as president of the International Wine Lawyers Association and operates his own vineyard, producing specialty wines. Dick Lemon lectures widely on winery finance and vineyard leasing and is a principal of Silverado Partners, which acquired Beringer Wine Estates from Nestle in 1996.

DP&F may be the wine industry's leading law firm in that, for example, it has handled vineyard leases in 13 of California's counties, has represented the buyer or seller in more than 20 winery acquisitions (by far the largest market share for any law firm), and has represented clients in Oregon, Washington, Texas, New York, and abroad.

For more information, contact:
Dickenson, Peatman & Fogarty
809 Coombs St., Napa, CA 94559
tel: 707/252-7122; fax: 707/255-6876
e-mail: dpf@dpfnapa.com

BANK OF AMERICA

Santa Rosa Regional Commercial Banking Office

Since 1911, Bank of America has helped to finance California's wines. Today Bank of America is the single largest commercial bank lender to the wine and grapegrowing industry. From coast to coast, from the smallest winery to the largest grower of wine grapes, Bank of America offers financial solutions tailored to meet the size and market of any wine business.

Bank of America

Bank of America can provide commercial loans, both short and long-term, to finance inventory, receivables, equipment, barrels, facility expansion, and vineyard purchase and development. Bank of America can help grow your international business through letters of credit, foreign exchange, and foreign currency hedges. Through its subsidiary, Banc of America Securities, Inc., Bank of America provides access to the public equity markets, high yield debt, private placements, merger and acquisition services, and corporate finance advisory.

For more information, contact:
Bank of America
Santa Rosa Regional Commercial Banking Office
Massey Bambara, Senior Vice President
Jim Kimball, Vice President
10 Santa Rosa Ave., 2nd floor
Santa Rosa, CA 95404
tel: 707/525-2331; fax: 707/525-2287
website: www.bankofamerica.com

NATIONAL BANK OF THE REDWOODS

National Bank of the Redwoods (NBR) was founded in 1985 as a commercial bank serving businesses and entrepreneurs in the coastal redwood region of northern California. NBR is a wholly owned subsidiary of Redwood Empire Bancorp, a publicly owned corporation traded on NASDAQ (ticker symbol "REBC").

NATIONAL BANK OF THE REDWOODS

NBR finances a wide array of business activities and provides a full range of banking services, including merchant bank card processing, cash management services through personal computer software, courier services, electronic tax payments, and a variety of deposit services. NBR experts — including a team of Business Development Officers — will "bring the bank to you."

NBR operates seven convenient locations to serve you: downtown Santa Rosa, Cleveland Avenue, Montgomery Village, Sebastopol, Rohnert Park, Ukiah, and Lakeport. National Bank of the Redwoods is your "Partner in Progress."

For more information, contact:
National Bank of the Redwoods
111 Santa Rosa Ave., Santa Rosa, CA 95404
tel: 707/573-4800; fax: 707/579-1073
website: www.nbronline.com

JOSEPH W. CIATTI COMPANY LLC

The Joseph W. Ciatti Company LLC is the wine industry's oldest, largest, and most comprehensive bulk wine brokerage in the U.S. and internationally. Annual sales are over 80 million gallons (or 300 million liters).

The company offers a full array of wine brokerage services, including grape contracts; grape processing contracts; complete negotiations of bulk wine purchasing and sales; tasting, blending, and finishing wines by on-staff enologists; objective information, including comprehensive long-term market analysis; evaluation of inventory quality and current market values; and locating unlabeled case goods or wine for private labeling.

The Ciatti Company has the most extensive and up-to-date product line of premium varietals; generic wines; grape and fruit concentrates; brandy and high proof from grape, citrus, and grain. Internationally, Ciatti brokers exports of U.S. wines to overseas markets and imports of foreign wines to California labels and wineries, including wines from Chile, France, Argentina, and other major wine growing regions.

Joe Ciatti, John Ciatti, Richard de los Reyes, and Greg Livengood specialize in premium coastal varietals and share responsibility of all California wineries. Greg also, along with Chris Braun and Dennis Collins, covers international markets and wineries outside California. Andy Bivona and Brad Miller specialize in grape concentrate, beverage alcohol, and food specialty products.

For more information, contact:
Joseph W. Ciatti Company LLC
1101 Fifth Ave., #170, San Rafael, CA 94901
tel: 415/458-5150; fax: 415/458-5160

PLEASE SEE THE JOSEPH CIATTI CO. AD, PAGE 35.

FIFTH RESOURCE GROUP

The Fifth Resource Group, LLC., is a full-service architectural/process engineering firm with a specialty in the wine industry. As owner's representatives, recent California projects include: Seguin Moreau and Demptos Napa cooperages and Tonnellerie Radoux's new Santa Rosa cooperage; masterplans and barrel warehouses for Franciscan Vineyards (Rutherford) and Seghesio Winery (Healdsburg); Korbel River Road Hospitality, Deli, and Brewery; Lake Sonoma Winery redesign.

The Group has utilized industrial engineering methodology to do capacity planning models for many other California wineries.

The Fifth Resource Group services include feasibility studies, master planning, process sizing and flow analysis, architectural design, industrial engineering, construction documents preparation, government permitting coordination, construction bidding, and project management for new and existing wineries. Your facility needs are integrated to meet your business plan for acquisition, development, maintenance, and disposition.

For more information, contact:
The Fifth Resource Group, LLC.
PO Box 30, Cotati, CA 94931
tel: 707/664-1797; fax: 707/664-1710
Call one of the co-principals directly:
Ed Sohl, AIA: 707/953-8042;
Jim Ford, REA: 707/484-1688
e-mail: jrford@pacbell.net
website: http://www/fifthresource.com

E T S LABORATORIES

E T S Laboratories has served the wine industry with practical solutions to real winemaking concerns for over 20 years. E T S is located in a custom-designed facility in the St. Helena Wine Business Center. Design of the new laboratory has increased efficiency and greatly reduced analytical turnaround times.

E T S employs an array of sophisticated technologies to provide the highest quality data in the shortest time possible. Instrumentation capabilities include gas chromatography with various selective detectors (GC), gas chromatography/mass spectroscopy (GC/MS), liquid chromatography (HPLC), flame and graphite furnace atomic absorption, capillary electrophoresis, and multiple automated chemistry analyzers. All are available in-house with a variety of configurations to provide a complete range of analytical capabilities.

E T S is accredited by the American Association for Laboratory Accreditation to ISO Guide 25 quality standards.

E T S continues to meet and exceed your analytical needs by providing the highest standards in analytical data, quality assurance, customer service, and client confidentiality.

For more information, contact:
E T S Laboratories
899 Adams St., Suite A, St. Helena, CA 94574
tel: 707/963-4806; fax: 707/963-1054
e-mail: info@etslabs.com

PLEASE SEE THE E T S LABORATORIES AD, PAGE 55.

LARKIN & ASSOCIATES, Inc.

Larkin & Associates has been involved in mechanical engineering design for wineries for 20 years.

Located in Sonoma County, Larkin & Associates specializes in design of heating, cooling, and plumbing systems for wineries. The firm is familiar with the special needs of wineries and wine-making processes.

LARKIN & ASSOCIATES, INC.
MECHANICAL ENGINEERS

Recent projects and clients include Dominus Estate, Geyser Peak Winery, Cakebread Cellars, St. Francis Winery, Franciscan Estates, Ravenswood Winery, Beaulieu Vineyard, Silverado Vineyards, Chateau St. Jean, Sterling Vineyards, Fetzer Vineyards, Swanson Vineyards & Winery, Sonoma-Cutrer Vineyards, Klein Family Vintners, Girard Winery, and Kendall-Jackson Winery.

Some of the services offered especially for wineries include design of CO_2 ventilation, night-air cooling, HVAC, process waste systems, hot water systems, refrigeration consulting, and energy and moisture studies.

Through the years, Larkin & Associates has developed a reputation for high quality design and responsive service. The firm has strong continuing relationships with several wineries and with winery architects and contractors. Owner Paul Larkin shares an interest in wine and has visited wineries in France, Italy, and Germany.

Larkin & Associates wants to continue to serve the wine industry by designing cost-effective, efficient systems for wineries, large and small.

For more information, contact:
Larkin & Associates, Inc.
130 S. Main St., Ste. 201, PO Box 2339
Sebastopol, CA 95473
tel: 707/823-1010; fax: 707/823-9363
e-mail: info@larkinme.com

MOTTO, KRYLA & FISHER LLP

Motto, Kryla & Fisher LLP (MKF), a leading firm of wine business consultants and accountants, provides business consulting, accounting, and tax services exclusively to wineries and vineyards. MKF is the only such firm devoted exclusively to the premium wine industry.

MKF's consulting department offers sale and acquisition services, business valuations, forecasts and planning, strategic marketing plans, operations review, litigation support, computer systems and support, and management consulting services. MKF is often involved in major transactions on an advisory basis.

CPAs in MKF's accounting department perform independent audits or reviews of financial statements. MKF financial reports are unique in providing insight into wine business results and trends.

MKF

MKF's tax department provides strategic tax planning for wineries and vineyards, as well as transaction and individual tax planning. MKF's specialized industry expertise extends to income, estate, gift, and property taxes.

MKF is a leading economic research firm on wine market trends and publishes a number of industry economic studies. MKF also conducts market research for wine companies on a consulting basis and conducts industry seminars, including seminars for individual companies. Publications include *US WineStats*, *MKF Grape Trends*, *MKF Vineyard Cost Study*, the *Economic Impact of the California Wine Industry*, and a series of wine industry newsletters.

For more information, contact:
Motto, Kryla & Fisher LLP
The Wine Business Center
899 Adams St, Ste. E, St. Helena, CA 94574
tel: 707/963-9222; fax: 707/963-1379
website: http://www.mkf.com

TRAGON CORPORATION

For 25 years, Tragon Corporation has been a leader in consumer research and sensory evaluation. The full-service marketing research firm has extensive experience in the wine industry. Tragon applies its unique experience in sensory sciences, behavioral psychology, physiological psychology, enology, and statistics to develop comprehensive product information to meet your specific needs.

Tragon provides customized research utilizing internally developed methodologies, many of which have become industry standards. Its integrative and innovative approach to product testing will help you better understand your consumer and increase market share.

Tragon developed the Quantitative Descriptive Analysis (QDA®) program, which "fingerprints" products to identify unique characteristics and provide development direction, and Product Optimization (PROP®), which identifies sensory characteristics that drive preferences and provides precise direction for formulation.

Product Assessment and Consumer Expectation (PROP-Plus®) identifies marketing and imagery issues that drive product preferences, describes unique opportunities and preference groupings, and establishes relative importance of key consumer quality criteria. Tragon rounds out its expertise with qualitative research, such as focus groups, surveys, and interviews.

Tragon recently introduced a new menu-driven Windows-based Interactive QDA® Software package, which automates analysis, interpretation, and presentation of (QDA®) research.

Tragon clients benefit from its broad experience in worldwide market testing and its ability to make *sense* out of your consumer market and meet today's market challenges.

For more information, contact:
Tragon Corporation
Rebecca Bleibaum
365 Convention Way, Redwood City, CA 94063
tel: 650/365-1833; fax: 650/365-3737
website: www.tragon.com

HANSEL LEASING

Hansel Leasing, Inc., is a full service automobile, truck, and equipment leasing company that has served Sonoma and Napa counties for over 30 years. Hansel specializes in leasing winery equipment, including wine barrels, labeling machines, bottling machines, wind machines, stainless steel tanks, barrel racks, and many other types of equipment that are important to producing good wine. The company also leases trucks, tractors, and cars.

Many types of lease programs are available, ranging from 24 months to 60 months. Hansel has fair market value leases as well as guaranteed value leases. You can put money down or apply minimal "get in" fees. Hansel provides very flexible credit terms and is quite willing to work out deals for special situations. The staff is quite well-versed in the winery and vineyard business. Hansel's current client list includes Geyser Peak Winery, Codera Wine Group, Hansel Vineyards, Testarossa Winery, Vinifera, Inc., Castle Vineyards, Villa Adriana, and Knollwood Vineyards.

For more information or a lease quote on any of your current or future needs, contact:

Hansel Leasing, Inc.
2800 Corby Ave., Santa Rosa CA 95407
tel: 707/525-1545; fax: 707/544-7801

WINE COUNTRY REAL ESTATE

KAREN KENNY, BROKER

Wine Country Real Estate is a full-service brokerage specializing in vineyard and estate properties. Owner/ broker Karen Kenny has been one of Sonoma County's top producing realtors since 1977. She draws on her background in viticulture, advertising, and art to bring a unique perspective to her work in real estate marketing and consulting.

Karen has recently made the transition from a one-person operation, Karen Kenny Fine Properties, to Wine Country Real Estate with an enthusiastic and competent staff. Karen has moved her office to 421 Healdsburg Avenue in Healdsburg; she and her staff are available seven days a week.

Karen is a successful investor, developer, and winegrape grower. She holds a degree in viticulture from Santa Rosa Junior College. Her professional career includes experience in advertising, publishing, and film production, and she has been a professional artist. She is a member of many community as well as professional organizations, including North Coast Grape Growers Association and the Realtors Land Institute.

Karen has an ongoing record of success because she focuses on her clients' individual needs and tailors her approach to the special details of their situation.

For more information, contact:

Karen Kenny, Wine Country Real Estate
421 Healdsburg Ave., Healdsburg, CA 95448
tel: 707/433-2700; fax: 707/433-2052
e-mail: kfine@sonic.net

PLEASE SEE THE KAREN KENNY AD, PAGE 78.

KEMPKEY INSURANCE

Kempkey Insurance & Risk Management Services (Napa, CA) offers one-of-a-kind protection for wineries in a single comprehensive policy. Recently approved by the California Department of Insurance, Kempkey's unique policy brings together specific types of coverage frequently requested by wineries that fall outside a standard business policy.

Part of Kempkey's Preferred Winery Risk Management Program, the new policy includes coverage for agreed valuation for stock (covers loss of future profits), wine leakage, contamination, mechanical breakdown, product recall expense, trellising, and vines.

More than an insurance provider, Kempkey offers risk management solutions for the wine industry. Winery clients are educated about risk assessment, risk control, risk transfer, claims management, and injury and illness prevention through Kempkey's STAR Program: **S**avings **T**hough **A**voiding **R**isk.

KEMPKEY INSURANCE
&
RISK MANAGEMENT SERVICES

Another part of the STAR program is an Injury and Illness Prevention Toolkit on CD-ROM that includes downloadable templates. Topics on the CD-ROM include safety rules written for every segment of a winery operation from the tasting room and administrative offices to production and field operations.

Kempkey Insurance & Risk Management Services invites wineries to learn more about its exclusive programs on a free CD-ROM demo for PC-based computers. Simply contact Kempkey Insurance or visit Kempkey's website to request the free demo.

For more information, contact:

Kempkey Insurance &
Risk Management Services
211 Gateway Road West, Ste. 206
Napa, CA 94558
tel: 707/253-8682 or 800-726-8682
fax: 707/253-7239
e-mail: ed@kempkey.com
website: www.kempkey.com

PLEASE SEE THE KEMPKEY INSURANCE AD, PAGE 31.

STORM ENGINEERING, Inc.

Storm Engineering offers winery utility systems planning, design, and construction services for new and expanding wineries.

Storm Engineering is currently assisting a number of clients, both in the U.S. and overseas, with winery ventures that blend old and new technology, creating balanced designs that make its engineering inputs all the more interesting and creative.

Many previous clients are expanding facilities and have retained Storm Engineering to help them through design and construction with a minimum of disruption to wine production, tours, and tastings.

The changing logistics of grape transport, influenced by the underlying

need for quality control of the end product, have inspired a significant number of vineyard operators to provide juice and must production facilities to serve their customers. Integrating the special needs of juice/must facilities, which will function only during the short harvest season and remain idle for the rest of the year, brings the objectives of optimizing costs for crush, press, chiller/heat exchanger, storage, and daily production capacity into a tight matrix of variables that requires the utmost in creative design and innovation.

Storm Engineering can plan and design systems that will meet current production requirements for table/sparkling wineries and juice/must producers and allow modular planning of future expansions.

For more information on client lists or to discuss a pending winery project, please contact:

Storm Engineering, Inc.
D.R. Storm, Ph.D., P.E.
15 Main St., Winters, CA 95694
tel: 530/795-3506; fax: 530/795-1119
PLEASE SEE THE STORM ENGINEERING AD, PAGE 73.

BROTEMARKLE, DAVIS & Co. LLP

"Unique Expertise for a Unique Industry."

Because of the ageing of fine wines, decisions need to be made today that will affect sales three to five years in the future. You need innovative financial consultants with the same foresight. Brotemarkle, Davis & Co. provides that foresight to many of the Napa Valley's most profitable wineries, vineyards, and related businesses.

It is easy to make promises of great service and support, but how do you know those claims will be fulfilled? The best way is to ask Brotemarkle, Davis & Co. customers, and that is why Consumer Valuestar was hired to rate the company's customers' satisfaction.

Consumer Valuestar is only awarded to companies that pass all four steps of an independent rating process. The most difficult step to pass is the customer satisfaction rating conducted by the Public Research Institute (PRI) at San Francisco State University. Based on the results of this research Brotemarkle, Davis & Co. has been formally ranked very high in customer satisfaction and has been awarded the Consumer Valuestar symbol.

Call Brotemarkle, Davis & Co. today to see how its team approach to solving problems can help you and your business.

For more information, contact:
Brotemarkle, Davis & Co. LLP
David H. Brotemarkle CPA
Thomas J. Davis CPA
Craig A. Underhill CPA
1200 Main St., St. Helena, CA 94574
tel: 707/963-4466; fax: 707/963-4712
e-mail: Dave@napavalleycpas.com
website: www.napavalleycpas.com
PLEASE SEE THE BROTEMARKLE, DAVIS AD, PAGE 52.

FRED LYON PICTURES

Fred Lyon is the wine industry's own photographer. In over three decades of steady work and endless innovation, he has traveled the globe and photographed countless vineyards, wineries, and winemakers. His images have appeared in scores of magazines and books, advertisements, and brochures.

Lyon, who is himself a Napa Valley grapegrower, maintains America's most comprehensive and active collection of wine-related photography. The Lyon International Wine Library spans subjects from the planting of the vine to wine in the glass, from workers in vineyards to royalty in the grand salons of Europe. Barrels and bottles, kitchens and wineries, enologists and chefs, and lifestyles and recreation in winegrowing regions. Many pictures are specific, but a full range of generic subjects is also available.

For wineries and wine marketers, Lyon creates strong, graphic images for persuasive advertising and brochures. This is high-energy photography from an unusual breadth of experience and from a photographer who is friendly, responsive, and reliable.

For more information, contact:
Fred Lyon Pictures
495 Carolina St., San Francisco, CA 94107
tel: 415/431-3111; fax: 415/431-0273
e-mail: fredlyon@ricochet.net

THE WINE LAB

In 2000, The Wine Lab celebrates its 25th anniversary. Founded in 1975 to provide chemical and microbiological tests to wineries, The Wine Lab now offers winemakers a broad range of user-friendly technical services and practical assistance under the guidance of Director Lisa Van de Water and Enologist Sarah Quider.

The Wine Lab's special expertise is in using test results to assist in maintaining or improving wine quality. The company motto, "More than just numbers," expresses a commitment to helping winemakers understand what their results mean and what to do next.

Unsurpassed in sleuthing the causes of spoiled wine, The Wine Lab emphasizes problem-solving and troubleshooting, offering advice tailored to fit each winemaker's specific circumstances, from 50 gallons to 50 million. At The Wine Lab, technology is used as a tool to assist, not to replace, the art of winemaking.

Always at the forefront of microbiological developments, The Wine Lab has participated in extensive research on many aspects of microbial activity in wine. Current research topics include: NOPA and ammonia changes during ripening, nutrient and vitamin requirements of *Saccharomyces* and *Leuconostoc*, DNA characterization of winery-resident *Saccharomyces* strains, effects of lysozyme on spoilage microbes, *Lactobacillus* species involved in spoilage during fermentation, *Brettanomyces* growth, and culturing *Phaeoacremonium*.

The Wine Lab is also dedicated to making technical information accessible to winemakers through clearly written literature, hands-on classes and workshops for wineries, and international Internet connections. Lisa Van de Water has given technical presentations in 20 states, Canada, and New Zealand for more than 20 years.

For more information, contact:
The Wine Lab
477 Walnut St., Napa, CA 94559
tel: 707/224-7903; fax: 707/255-2019
e-mail: winelab@aol.com
In New Zealand:
Pacific Rim Oenology Services
Private Bag 1007, Blenheim
tel: 64-3/577-9000; fax: 64-3/577-9001
e-mail: pros@hort.cri.nz

HALL & BARTLEY

Hall & Bartley is a full-service architectural firm, specializing in winery design. Founded in 1983, the firm is responsible for the designs of Silverado Vineyards, Michel-Schlumberger, Atlas Peak Vineyards, Kendall-Jackson's La Crema facility, Marimar Torres Estate, Flowers Winery, and the master planning and/or expansions of Meridian Vineyards, Buena Vista Winery, Turnbull Wine Cellars, Vinwood Winery, Chateau Souverain, Geyser Peak Winery, and Waterbrook Winery.

Current projects include "J" Wine Company master plan/expansion, Wild Oak Vineyards, Clos LaChance Winery, Chateau St. Jean master plan, Stags' Leap master plan, and Meridian Vineyards master plan expansion.

Hall & Bartley's services include feasibility studies, master planning, process sizing and flow analysis, architectural design, construction documents preparation, government permitting assistance, construction bidding assistance, and construction administration for new or existing winery projects.

For more information, contact:
Hall & Bartley
4701 Old Redwood Highway
Santa Rosa, CA 95403
tel: 707/544-1642; fax: 707/544-1646

PLEASE SEE THE HALL & BARTLEY AD, PAGE 56.

SILICON VALLEY BANK

In 1992, Silicon Valley Bank identified the premium wine industry, which at that time most banks considered to be very risky, as an opportunity for service. Accustomed to challenging conventional wisdom, Silicon Valley Bank applied the same business skills and analysis that helped it in working with the software and semiconductor industries toward developing a methodology for serving wineries and vineyards. The results have been extremely gratifying.

With an office in St. Helena focused exclusively on wine, Silicon Valley Bank's Premium Wine Division is providing a full range of banking services throughout the West. It has now loaned some $100 million to more than 70 wineries. Silicon Valley Bank has staffed its Premium Wine Division with experts in wine lending who make loans only in this market. With $4 billion in assets, Silicon Valley Bank is the largest independent bank based in Silicon Valley, and it is the only bank in the U.S. with a division focusing exclusively on serving the financial needs of premium growers and vintners.

For more information, contact:
Silicon Valley Bank
Premium Wine Division
899 Adams Street, Ste G-2
St. Helena, CA 94574
tel: (707) 967-4825; fax: (707) 967-4827

PLEASE SEE THE SILICON VALLEY BANK AD, PAGE 44.

CRAIG ROOT & ASSOCIATES

Craig Root & Associates offers cost-effective opportunities to increase profits and enhance the visitor experience. Remember — you are not just selling wine — you are selling memories. An entertaining and informative visit to a visitor center stays in the consumer's mind long after more expensive advertising has faded.

The company's partial client list includes: Acacia Winery, Clos Pegase Winery, Domaine Carneros, Handley Cellars, Heitz Wine Cellars, Indian Springs Winery, Jelly Belly Candy Co., Fess Parker Winery, Franciscan Vineyards, Freemark Abbey Winery, Kendall-Jackson Vineyards, Kenwood Vineyards, V. Sattui Winery, St. Clement Vineyards, Stag's Leap, Tra Vigne Restaurant, Vichon Winery, Wilson-Daniels Ltd., Zaca Mesa Winery, Niebaum-Coppola Winery, and Kauai Coffee Company.

Craig Root's consulting services cover several areas of visitor center performance:

1. Complete visitor center start-up (design review, business plan, income/expense projections, tour creation, trade relations, and complete retail room organization).
2. Appraisal of current operations (through direct consulting and/or a "mystery audit" program) to cover all phases listed in #1. Including helping staff develop strategies for more effective tour guide skills, such as voice and delivery — through videotape assessment.
3. Direct mail programs (from start-up to fine-tuning an existing program).
4. Trade relations: How to achieve better results with your VIP buyers.
5. Audiovisual presentations (video and/or multimedia).
6. Special events coordination (catering, entertainment, decorations, and event themes).

For more information, contact:
Visitor Management Resources
Craig Root & Associates
744 Sunnyside Rd., St. Helena, CA 94574
tel: 707/963-7589; fax: 707/963-6009

VINQUIRY

Vinquiry now offers services on California's Central Coast. The laboratory, headquartered in Windsor, CA, has opened a new satellite lab located at 2717 Aviation Way, Suite 100, in Santa Maria.

This rapidly growing wine region had a need for laboratory services. By being in the Central Coast region, Vinquiry is able to provide quicker results on a critical number of analyses and to offer a convenient location for a stock of reagents, labware, and innoculants.

Some of the analyses Vinquiry currently provides in Santa Maria include a harvest nutrient profile of ammonia and assimilable amino nitrogen, pH, titratable acidity, Brix, volatile acidity, free and total SO_2, malic acid, and glucose + fructose. For samples that require other analyses, the satellite lab ships overnight or by courier to its main lab in Windsor.

MaryAnn Graf and Samantha Koller are running the satellite lab and are available from 8:30 AM until noon and from 1:00 PM to 5:00 PM to answer any questions or take in samples.

For more information, contact:
Vinquiry, Inc.
Central Coast
2717 Aviation Way, Ste. 100, Santa Maria, CA
tel: 805/922-6321; fax: 805/922-1751
North Coast
7795 Bell Rd, Windsor, CA 95492
tel: 707/838-6312; fax: 707/838-1765

GRANT THORNTON LLP, Accountants & Management Consultants

Grant Thornton's professionals serve the manufacturing and distribution industry from seven California offices and more than 48 locations throughout the U.S. with international offices worldwide.

The firm focuses on industry specialization through integrated service teams. Each professional brings a specific expertise, and the team maintains a close alliance while providing sound, objective business advice.

Wine industry experience and a business focus enable Grant Thornton to address issues most relevant to wineries and producers. The firm's extensive use of computer tools bring efficiency to audit compliance and consulting issues; the professionals bring the experience.

As technology revolutionizes the process and government regulation increases, winemakers must be agile and highly responsive while continuing to maintain their customer-driven core values.

Grant Thornton's specialists are equipped to provide a wide variety of services:

- Information systems and communications networks
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- Logistics and supply chain management
- Reengineering
- Strategic services
- International services (ISO-9000)
- Succession and estate planning
- State and local tax issues

Grant Thornton's Central Valley and greater Bay Area locations allow easy access to the entire wine region of Northern California.

For more information, contact:
Grant Thornton LLP
509 W. Weber Ave., Ste. 300
Stockton, CA 95203
tel: 209/546-8000; fax: 209/462-3661
website: www.gt.com

PLEASE SEE THE GRANT THORNTON AD, PAGE 27.

SUMMIT ENGINEERING, Inc.

Hire a professional team that cares about your project. Summit's motto is "Quality engineering with personal service." This company understands how important your project is to you. Summit has provided design services to over 170 wineries since 1975 and has extensive knowledge of the winemaking process.

Summit is unique in the wine industry in that it offers a full array of disciplines to clients. With Summit, you hire one firm and receive the following services:

SUMMIT

Master Planning — facility process and equipment layout;

Permitting Assistance — aid in permit processes for projects throughout California and other states;

Sitework Design — grading, drainage and storm water management, erosion control, roadways, parking lots, truck maneuvering areas, site utilities design, and mapping;

Structural Design — tilt-up concrete, wood, metal, reinforced masonry structures, and seismic retrofitting;

Sanitary and Process Wastewater Design — domestic, agricultural and industrial process wastewater management systems.

Summit has the trained staff that can look at the whole picture of your project to make sure that all the pieces work efficiently together. The staff at Summit take pride in their ability to provide timely, quality engineering with personal service. In the words of Summit president, Bill Phillips, "Let us help you turn your needs into reality!"

For more information, contact:
Summit Engineering, Inc.
1400 North Dutton Ave. #24
Santa Rosa, CA 95401
tel: 707/527-0775; fax: 707/527-0212
e-mail: Summit@metro.net

PLEASE SEE THE SUMMIT ENGINEERING AD, PAGE 26.

LPS, Inc.

LaCalle Bilingual Consulting and Training

Need help training and communicating with Spanish-speaking employees? Are employee relations complex or difficult? Do cultural differences get in the way of mutual understanding? Dr. Trula M. LaCalle has the human relations and Hispanic cultural knowledge that will benefit you.

If you are unsure where to begin, a needs assessment consultation will help you discover how to improve employee relations and increase productivity. Dr. LaCalle offers training modules, in English or Spanish, on subjects such as: leadership and supervisory skills, cross-cultural communication, team building, conflict resolution, workplace hostility and violence, sexual harassment, change management, and organizational/interdepartmental communication.

She also conducts critical incident debriefings following a workplace crisis or trauma, and if you want a leadership retreat, she will plan and present an event tailored to your leadership team's needs. Or if you just want to talk about a thorny issue in order to clarify your thinking and obtain some new ideas, telephone consultations are convenient.

Dr. LaCalle has worked for many wineries and vineyards, from internationally known enterprises to small, family businesses. You may recognize her name from the various human resources articles she has published in *PWV*. She is a non-Hispanic married to an Hispanic. Her Ph.D. is in Leadership and Human Behavior, and she draws on more than 20 years of professional experience.

Based in Sonoma County, CA, Dr. LaCalle also works in other regions. No matter where you are located, call her toll-free for help at your site or for telephone consultation.

For more information, contact:
LPS, Inc.
Trula M. LaCalle, Ph.D.
PO Box 518, Sebastopol, CA 95473
tel: 888/LACALLE or 707/829-9496;
fax: 707/829-6981
website: http://www.LaCalle.com

SCOTT LABORATORIES, Inc.

Scott Laboratories offers a variety of technical and processing services to wineries.

Scott's laboratory is the senior independent wine laboratory in North America. Since its founding in 1933, it has provided analytical services to the wine and spirits industries.

From the beginning, Scott's service has been consultative in orientation. Problem solving receives equal billing with speed and accuracy. In-house options include gas chromatography, HPLC, and atomic absorption.

In addition to consultative work, other specialties include fermentation trouble-shooting, filterability testing, and BATF-certified analysis for export. The laboratory is also certified by the State of California for water analysis (including well and waste water).

In addition to outside services, the laboratory at Scott also provides technical support for customers who use the enzymes, tannins, gelatins, and adjuvants offered in Scott's portfolio of winemaking supplies. These products have been shown to be useful winemaking tools that can target specific winemaking problems, such as clarification, color stability, structure, and harsh tannins.

For more information, contact:
Scott Laboratories, Inc.
2220 Pine View Way, Petaluma, CA 94954
PO Box 4559, Petaluma, CA 94955-4559
tel: 707/765-6666; fax: 707/765-6674
e-mail: scottlab@ix.netcom.com
Scott Laboratories, Ltd.
1845 Sandstone Manor, Unit #14
Pickering, Ontario L1W 3X9, Canada
tel: 905/839-9463; fax: 905/839-0738

PLEASE SEE THE SCOTT LABS ADS, PAGES 26, 77.

GEORGE M. SCHOFIELD Co.

George M. Schofield is a financial and real estate professional specializing in vineyards, wineries, and undeveloped land. He offers economic and financial planning with special interests in the wine and grape industry to provide the small agricultural business with the economic and financial expertise to successfully operate in a competitive environment. While examining economic indicators and using forecasting to aid clients in short-term and long-term planning, he also evaluates investment opportunities and, with the use of computer models, simulates possible outcomes.

George M. Schofield is a CPA and has a MBA degree from Harvard. He served 10 years as CFO of Robert Mondavi Winery before establishing his own consulting business in St. Helena in 1984. He also holds a current real estate broker license.

For more information, contact:
George M. Schofield Company
PO Box 170, St. Helena, CA 94574
tel: 707/963-3333; fax: 707/963-1285

BARBARA LINDBLOM — Consultation Services

For more than 23 years, Barbara Lindblom has been working with a wide range of wines, ideas, and individuals in the wine industry. Whatever the project, her objective is always to develop customized programs that meet the specific needs and styles of her clients.

In addition to general winemaking consultation, Lindblom provides unique and innovative services in experimental design and sensory program development.

Her clients have ranged from individual growers and growers' associations to wineries, brokers, and distributors. She has helped them develop strategies and programs that have produced:

- Successful tastings and seminars for her clients and their customers,
- Clear definitions of wine style,
- Practical experimental design,
- Improved tasting practices and expanded use of sensory techniques,
- Training programs that improve both tasting competence and confidence.

When you find yourself with a tasting or experimental project, problem, or inspiration, her clients would agree that calling Barbara Lindblom is a good place to start.

For more information, contact:
Barbara Lindblom — Consultation Services
1915 Diamond Ct., Santa Rosa, CA 95404
tel: 707/ 544-2910; fax: 707/544-3691

CORREIA-XAVIER, INC.

Tony Correia, ARA, and Stanley Xavier, Jr., joined in October of 1992 to form Correia-Xavier, Inc., (C-X). The firm specializes in the appraisal of, and consulting on, agricultural properties. The firm pursues no other activities.

The company maintains a broad database of historical information on agricultural land sales and values, and local, national, and global trends in agricultural economic forces and supply/demand relationships. Utilizing state-of-the-art technology, this data is filtered through traditional appraisal methodology and techniques to derive accurate, relevant findings of value for the firm's clientele.

C-X appraisers combine real-world experience with extensive professional education, preparing appraisals for lending, taxation, litigation support, estate planning, and gifting purposes.

The firm also maintains strategic alliances with skilled individuals and firms offering services in the areas of finance, accounting, property brokerage and management, and personal property and business valuations.

President Tony Correia has more than 25 years of experience in appraisal and holds the professional designation of Accredited Rural Appraiser (ARA), the highest rank and the only title conferred on Rural Appraisers by the American Society of Farm Managers & Rural Appraisers.

Qualified as an expert witness in many courts in California and Arizona, he has appraised for many governmental agencies, major agricultural lenders, attorneys, accountants, and property owners throughout California. He has also taught appraisal courses throughout the U.S. and Mexico and is a frequent speaker on agricultural, appraisal, taxation, and estate planning issues.

For more information, contact:
Correia-Xavier, Inc.
4186 W. Swift Ave. #106, Fresno, CA 93722
tel: 559/277-7474 or 800/841-5502
fax: 559/277-7479
e-mail: tony@c-x.com
website: www.c-x.com

PWV November/December 1999 Showcase will feature Equipment and Supplies for the Vineyard

CONTINUED FROM PAGE 7

industry has to come to its senses. We have to create a different category of wine for these products. I don't have any problem with people making these products, but don't call them Cabernet Sauvignon. Wine labels are confusing enough to the consumer without producers trying to sell non-wine products with wine names.

"On the international level, this subjects the U.S. to ridicule we don't need, especially with what we have been through in the past with the Burgundy and Chablis issue. Our wines just won't be taken seriously."

Currently the ATF is reviewing its labeling regulations on this issue. However, the issue is far from being resolved. Even when the ATF rules, its decision will not change the current FDA labeling regulations. Millions of dollars are being spent to promote formula wines to consumers; there is no way to predict what long-term effect this will have on wine consumers' buying habits.

"People in the wine industry must work together for a resolution of this issue," says Ross. "Short term gains for some in the industry could harm much of the wine industry as we know it and destroy our wines' reputation here and internationally." ■

Ken Freeze prepared this text for the California Association of Winegrape Growers, which submitted the text to PWV.

MOVING???

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PWV, 15 Grande Paseo, San Rafael, CA 94903-1534

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Where it all comes together

Vineyard site selection

A friend once joked that choosing a vineyard site is more important than choosing a spouse. This statement is arguable, but the importance of vineyard site selection is indeed great. Probably it is the single most important decision affecting profitability of a vineyard enterprise.

Yet, surprisingly, it is difficult to find much written on the subject for warm-area viticulture. Where temperatures are low, as in the eastern U.S. and Canada, site selection is all important to avoid winter freeze and to optimize growing season temperatures. But if temperatures are not limiting, then it seems that less attention is paid to site selection.

Marketing has reduced the importance of site selection in some areas. Many wine regions have developed reputations for quality, and this attracts further plantings in the same area, as with the North Coast of California. This tendency is further enhanced by declaration of American Viticultural Areas, (AVA).

However, a marked disadvantage of buying land in established regions is high land prices. For example, an established vineyard on a prime site in the Napa Valley might sell for as much as $65,000 to $100,000 an acre. This figure can be so high as to absolutely dominate all other costs of grape production, including vineyard establishment at between $20,000-$25,000 per acre.

This issue raises an interesting question. Might there be as yet undiscovered vineyard regions capable of producing premium quality wine? In these areas, land would probably be available at a substantially lower price, since it might currently be used for some other form of agriculture. If we could identify the regions with potential for grapegrowing, then we could anticipate that the quality reputation might follow planting, with savings in land cost.

Climate effects on wine quality

The two essential vineyard site components affecting wine quality are climate and soil, which are combined in the European concept of *terroir*. Of these, climate is by far the most important, and in turn, temperature is the most important element of climate in affecting quality. This fact was recognized by Maynard Amerine and A.J. Winkler in their classic 1944 study of factors affecting wine quality in California.

Temperature governs the vine's phenology, or rate of development. More important, it also governs the nature and rate of biochemical reactions in the plant, and so influences the grape berry composition and so eventual wine quality. Grapevine varieties differ in their temperature requirements for producing wines of different style and/or quality.

Pinot Noir is an example of a variety which demands cool temperatures to produce wines characteristic of the variety, while Chardonnay is capable of producing commercially important wines over a wide range of temperatures. I add hastily that premium quality Chardonnay wines are also grown in cooler conditions, but certainly this variety is less demanding than Pinot Noir is about temperature requirements.

Sunlight is also important, and sunny climates provide energy for high grape-sugar levels. The role of humidity is less well-understood, but empirical evidence would suggest that higher rather than lower humidity fosters wine quality, though fungal diseases might also be encouraged. Rainfall effects are well understood. Summer rain can provide for the water needs of the vine, although in a less convenient fashion than by irrigation, where of course, more control is possible.

Most growers think of rainfall in the growing season from a negative viewpoint, because rainfall stimulates fungal diseases. Botrytis bunch rot is induced by rain around harvest and is a major cause of loss of yield and quality in

Table I
Top 10 homoclime[1] matches of selected world viticultural areas by state

Comparable viticultural area		Bordeaux		Burgundy		Montpelier		Tuscany		Piedmont		Coonawarra		Barossa Valley		Heathcote	
		EHH[2]	HDD[3]	EHH[2]	HDD[3]	EHH[2]	HDD[3]	EHH[2]	HDD[3]	EHH[2]	HDD[3]	EHH[2]	HDD[3]	EHH[2]	HDD[3]	EHH[2]	HDD[3]
Homoclime ranking	1	OR	UT	NC	NC	CA	AZ	VA	TN	VA	NM	CA	CA*	CA*	CA	NC	NM
	2	OR	NM	NC	NC	CA*	GA	NC	NM	NC	CO	CA*	CA*	CA	NM	NC	NM
	3	OR	AZ	NC	UT	CA*	NC	VA	TX	VA	WA	CA	CA	CA*	CA*	NC	UT
	4	OR	UT	WV	UT	GA	TN	TN	TN	NC	WA	CA	CA	CA*	CA*	VA	CA
	5	OR	AZ	OR	ID	CA	TN	MD	AL	WV	CO	CA*	CA*	CA	CA	CA*	NC
	6	OR	OR	OR	ID	TN	NC	NM	KY	WV	KY	CA*	CA	CA*	CA*	SC	NC
	7	CA	NV	OR	WV	NC	NM	VA	TX	NC	WA	CA*	CA	CA*	CA	CA*	AZ
	8	WV	AZ	OR	NM	CA*	KY	WV	TN	AZ	CO	CA	CA*	CA	CA	NC	CA
	9	NC	CA	OR	NM	NC	NM	KY	TN	NC	WA	CA	CA*	CA*	CA*	CA*	CA*
	10	VA	CO	NC	WA	NC	WV	VA	KY	NC	WV	CA	CA*	CA	CA*	OR	NC

[1]Homoclimes are areas with similar climates [2]EHH — Effective heat days [3]HDD — Heat-degree days
* Known viticultural areas in California are marked with an asterisk.

many vineyards of the world.

Normally one uses some form of climate index to assess long-term average climate information for a region over a growing season or a year. The best known of these in America is the heat degree-day (HDD) concept adopted by Amerine and Winkler in 1944. This index is compiled by subtracting a base temperature (50°F or 10°C) from the monthly mean temperature, then multiplying by the number of days in the month. One can then compute so-called degree days for the growing season. Since its introduction, this index has been widely used to compare viticultural regions and vine performance. One disadvantage, however, is that the index takes no account of the effects of different temperatures on vine growth.

Recently, I have been studying climate data in Australia as a guide to where to plant Italian varieties. John Gwalter, a retired forester and part-time employee of Smart Viticulture, and I have developed a new viticulture climate index. We are using it to help us identify likely sites for grape planting.

This climate index takes into account the grapevine's photosynthetic response to temperature, as well as climate data for daily maximum and minimum temperatures and daylength, which depends on latitude and time of year. The index effectively estimates how much photosynthesis takes place during an average day each month, and so detects both high and low temperature limitations to vine growth. In essence, it estimates hours of growth potential per day. We have proven this index, which we call Effective Heat Hours (EHH), to be more discriminating than any other index tested.

Searching for new vineyard sites

There are several ways to search for new vineyard sites, all of which now use modern computing techniques. We begin with a known wine region we wish to emulate, and then we look for another place of similar climate, called a homoclime. Matching climates at the regional level is the first step, to be necessarily followed by consideration of soils, and so on, at the level of individual property selection. Typically we look for homoclimes of classical European regions. First we do a numeric search, which involves databases of climate information for the station to be matched and for a series of candidate stations. Then a statistical test can be used to determine how similar are the climate data sets.

The second method is to use graphing procedures, although this requires very sophisticated software and powerful computers. Climate recording stations are marked on a map, and then the climate for regions between the stations can be determined by extrapolation, taking into account differences in elevation, distance from large water bodies, and so on.

Using this method, we can generate maps, one for each climate parameter being investigated. Homoclime searches can be done graphically with ease, by determining which regions correspond to the climate of the station being investigated. Maps can be overlayed to find correspondence between a number of parameters.

Homoclime searches within the U.S.

We searched the database to find new vineyard sites in the U.S. that are temperature homoclimes for Piedmont and Tuscany in Italy (using respectively data for Govone and Firenze), for Bordeaux, Burgundy (Dijon), and the southern

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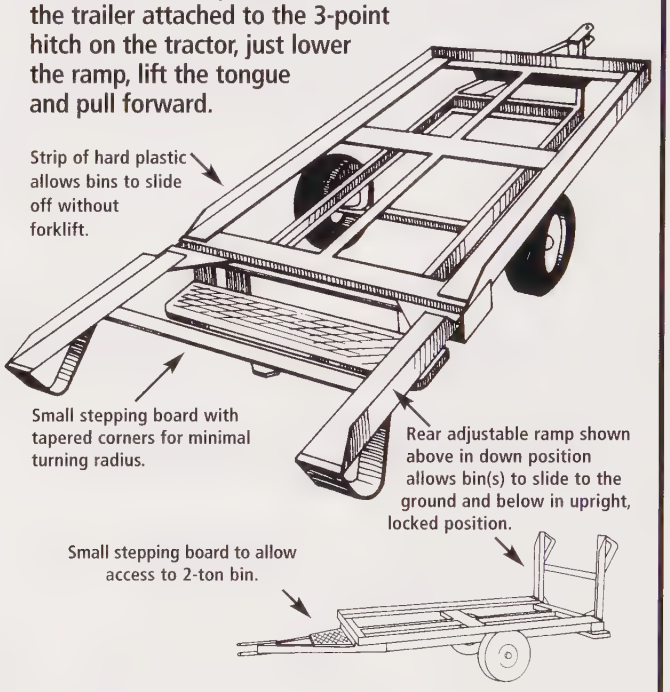
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Rhône Valley (Montpellier), as well as for three regions in Australia. These regions are Coonawarra, famous for Cabernet Sauvignon; the Barossa Valley in South Australia, (Nuriootpa), famous as a source of fruit for Grange Hermitage; and Heathcote in Victoria, also famous for Rhône-style Syrah wines.

Long-term average climate data was obtained for these stations from a variety of sources, including the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, which provided long-term average data for 4,775 stations across the U.S.

Results of the searches were most illuminating. EHH and HDD were calculated for a six-month growing period April to September. For most homoclimes sought, the two methods EHH and HDD gave different answers. This is not surprising, since HDD is based on average temperatures, and very high maximum values can be offset by very low minimum temperatures. However, the vine might do well in the reported average temperatures but fare poorly in the extremes. EHH is a better measure of how a vine will perform in the homoclime.

Consider the following chart which details the results of our search. Homoclime rankings demonstrate which is the better fit as measured statistically; the first ranked homoclime matches the closest. Results for the top 10 only are presented. I have not named specific towns but discuss states only, as I have not completed a full homoclime study. This requires matching also for humidity and rainfall, at the very least. Also there are a number of sites included here where winter temperatures will be too cold for commercial vinifera viticulture.

Contrast the results for Bordeaux, for example, where the top six EHH fits are in Oregon. Results for HDD-sorting were quite different, and more geographically disparate. No one climate station showed up in both lists.

Burgundy is a much more continental climate than Bordeaux, with greater difference between summer and winter temperatures. Eastern states and Oregon figure prominently in the EHH list, but less so for the HDD list. California occurs three times in the best 50 fits for EHH, and not at all for HDD.

Because Montpellier is a more Mediterranean and maritime climate, we might expect more homoclimes in California, as was the case. California had five of the top 10 EHH matches, including three existing vineyard areas, but HDD did not produce any homoclimes in California in the top 10 matches.

Results for Italian regions were similar to Burgundy. Tuscany produced homoclimes using EHH in eastern states, such as Virginia and North Carolina among others, with California twice in the top 50. HDD showed best fits in Tennessee, New Mexico and Texas with California occurring twice in the top 50. Piedmont also produced homoclimes in the eastern states with EHH, but HDD produced some matches in Colorado.

Homoclimes for Australian vineyard areas turned up more

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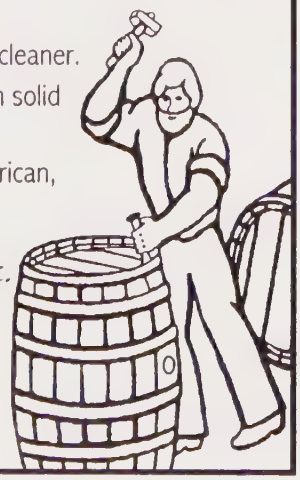

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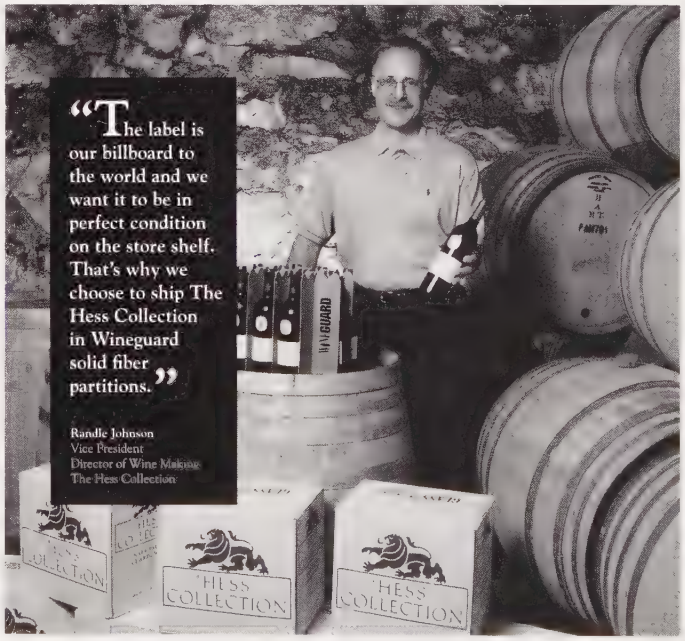
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stations in California. For example, the top 10 homoclimes for Barossa Valley using EHH were in California, and they included six known vineyard regions! For HDD, nine of the top 10 were in California, including five known vineyard areas. Results for Heathcote, a newer, cooler region in Australia were more scattered, with eastern states taking the lead in EHH but with three vineyard-area matches in California. For HDD, the two best matches were in New Mexico, with California appearing twice in the top 10. All 10 Coonawarra homoclimes were in California for EHH and HDD, including respectively four and seven known vineyard areas.

Conclusion

This preliminary study has turned up some interesting results. First, temperature homoclimes of some classic European regions are to be found more frequently in the eastern U.S. than the west. However, sites in Oregon did show similarity to Bordeaux and Burgundy. The West Coast is most similar to temperature conditions in Australia and Mediterranean Europe.

Within California, Oregon, and Washington, there are likely new regions well-suited to production of premium wine grapes that have not yet been recognized. Consequently, land prices are likely much lower in these areas than in traditional areas. Australian vintners have recognized this situation in their country, and using climate comparisons, they are planting many new regions.

The preliminary nature of these results must be emphasized. It appears that EHH is the appropriate index for studying homoclimes in U.S. as has been found in Australia. Further analysis, especially of susceptibility to winter freeze and summer rainfall around harvest, is required before any planting suggestions can be made. However, the results indicate the high potential of these techniques to identify new viticultural regions. ■

Dr. Richard Smart, "the flying vine-doctor," is an international viticultural consultant. Contact him in Australia by fax at 011-612-6584-0121, or by e-mail: vinedoctor@smartvit.com.au. Visit his home page at http://www.smartvit.com.au. He visits America frequently and can be contacted at Vinquiry in Windsor, CA, tel: 707/838-6312.

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by D.R. Storm, PhD. P.E.

PROVENCE — AN UNFORGETTABLE EXPERIENCE OF FOOD AND WINE

Taking advantage of a second residence exchange (ours in San Francisco; theirs in Beaumont du Ventoux, France) in early May 1999, my wife and I discovered the Provence that travel, food, and wine writers have been waxing eloquent about for as long as we can remember.

Our house exchange friends thoughtfully left a "filtered" listing of local wineries and their current price-smart and quaffable vintages — not a bad one in the lot. Food events (several le déjeuner *spectaculars reserved from the U.S. prior to departure) were so carefully orchestrated in timing, service, and food art that we lost our respectful, subdued behavior and began photographing some of the "surprises" with the reckless abandon of tourists. Picture this, if you will: Four servers arrive at the table simultaneously from different points of the compass. Each plate (on serving plate) is presented at the same instant and mirror-bright food covers are removed with flair in a single-motion to reveal a breathtaking food portrait.*

Down-to-earth Julia Child once said, "Don't be afraid of butter!" In our experience, if you have a tendency toward "butterphobia," the food options in Provence are very limited. To protect yourself, just keep repeating the mantra, "Le Paradox Français, Le Paradox Français;" *miraculously nullified by the Côte-du-Rhône wines, without which meals in Provence would be incomplete, the fact that your food swims in a sea of butter is no longer a threat, but is part of a benign plan to give you the joy you rightly deserve in this most wonderful of France's regions.*

Alice B. Toklas, Julia Child, and Alice Waters of Chez Panisse (Berkeley, CA) fame were all strongly influenced by Provence — now I know why.

Understanding pH control in a winery wastestream

Basics

Simply stated, pH is a relative measurement of a solution's acidity or alkalinity. Chemically speaking it is also the ratio of hydrogen ion (H^+) to hydroxyl ion (OH^-) in a solution. As most everyone who struggled through qualitative chemistry will painfully remember, when properly derived, Nester's Equation also produced a dazzling definition — pH is the logarithm of the reciprocal of the hydrogen ion concentration in a solution.

Why pH?

All wineries should be concerned about controlling pH in the wastestream to near neutrality (pH ≅7).[1] For large wineries (≥42,000 cases per year)[2], the waste treatment system of choice is usually the above-ground type (induced oxygen in a complete-mix reactor or aeration cell, all followed by clarification), where treatment of wastewater must include, among other things, neutralizing pH.[1]

The pH is adjusted to provide the most ideal wastestream environment possible for bacteria and yeasts, so they can reduce the mainly sugar and alcohol wastewater blend to carbon dioxide, water, heat, and stable residual organic compounds that may evolve from an achievable 85% to 95% solids reduction process step.

The second reason for pH adjustment in winery waste discharge is the requirement for nominal pre-treatment of the waste flow discharged to municipal or special district publicly owned treatment works (POTW). In the author's experience, all agreements between wineries and POTW operators include a provision for wastestream neutralization and/or screening prior to discharge to the POTW.

There is usually some latitude given in the achievement of the ideal 7.0 pH. Generally about one-half unit either way is acceptable, and short-term levels are not to exceed one pH unit either side of neutral in a 24-hour period; short-term excesses are not to occur more than twice in any month.

Installation of a sampling manhole in the winery's outfall sewer allows the POTW to randomly monitor waste discharge neutralization performance. (See discussion of sophisticated injection and control systems in subsection, *pH Reagent Injection and Control Systems.*)

Small wineries[2] with maximum daily flows below 2,500 gallons on sites that are blessed with the correct soil permeability, soil depth, slope, and depth of seasonal groundwater can often have well-conceived and constructed soil absorption systems (septic tanks and leachfields) for process wastewater that can function successfully for years. However, such systems must be respected for their fragile nature, and hydraulic and solids loading can not exceed their original design capacities.

Though the bio-reduction in a buried septic tank is fermentative and not oxidative, the anaerobic organisms that inhabit the tank and metabolize the carbonaceous waste can also function more efficiently with a pH at somewhere near neutral. Anaerobic digestion of solids produces volatile acids, which, without some pH adjustment, might keep the septic tank sludge compartment at well below the pH neutral condition favored by the benevolent microbes. Sampling the sludge compartment to measure pH may be difficult, but it is well worth the effort.

pH reagent injection and control systems

Because winery wastewater discharges are usually on the acidic side of neutrality, adjustments are made using an alkaline reagent, *i.e.* trisodium phosphate (TSP), ammonium hydroxide, or sodium or aluminum hydroxide. Unless the waste discharge from the winery is very large, the amount of reagent required is not excessive, and it doesn't have to be costly.

In California, for example, the Integrated Waste Management Board acts as a clearinghouse for "spent" industrial products of all kinds, including the aforementioned alkaline reagents, which are listed periodically in *The Waste Exchange* newsletter. For only pickup and delivery costs, the needed reagents can be readily available.

Injection/control systems can be simple, consisting only of a small fractional-horsepower injector pump with variable rate control and an interval timer. More complex systems have upstream and downstream pH probes (self-cleaning and self-calibrating) to provide very sensitive, loop feedback monitoring and control.

The injection should be made upstream from the treatment reactor (aeration cell or septic tank) in a zone of hydraulic

turbulence, such as a sewer junction or splitter box, so that thorough mixing of the reagent occurs. Fifty-five gallon drums placed in a drum cradle (handtruck configured for drums) can be safely handled by one maintenance individual.

Spare reagent storage drums and active drums should be isolated from any general public access by a security fence or locked structure. Maintenance personnel should be instructed on the safe handling of caustic reagents. Safety goggles and neoprene gloves should be required equipment when handling reagent drums and hoses/pipes.

Rates of reaction key to prevent over/under correction

The pH meter is an essential tool for monitoring the relative acidity or alkalinity of a wastestream, reactor, or treated effluent. The pH meter's electrode should be kept clean. A traditional chemistry laboratory distilled water "squirt bottle" works well for this. The instrument should also be calibrated frequently to ensure accuracy of measurements. (The self-cleaning and self-calibration "loop units" have been discussed above.)

The pH scale is logarithmic in nature, that is one unit of pH change is one order of magnitude change in hydrogen-ion or hydroxyl-ion concentration. Therefore:

pH 3 ≅ 0.001 gm-moles/L hydrogen-ion
pH 4 ≅ 0.01 gm-moles/L hydrogen-ion.

Another chemical property peculiarity of pH is that when pH is near neutrality, between pH 6.0 to pH 7.0, the **rate of change** in pH is much faster with the addition of an alkaline reagent than it is in a more acid wastestream. Thus, if the pH adjustment began at, say, pH 4.0, the change to pH 6.0 might take 10 minutes, while injecting an additional unit of reagent at pH 6 might produce an overcorrection or a pH of 8.0 very quickly.

The staff person who is responsible for monitoring pH must be trained to understand that a small addition of reagent can produce the desired neutrality in a short period of time once wastestream neutrality is close to the desired neutral level. ■

References

1. Storm, D. R. 1996. *Winery Utilities: Planning, Design and Operation*. Chapman & Hall, New York, NY, p. 233-237.
2. Ibid., p. 225.

David Storm is a consulting civil/sanitary engineer, specializing in winery utility systems. He is also the owner of Winters Winery and the author of the reference book, Winery Utility Systems: Planning, Design and Operation, *Chapman & Hall, New York, NY, 1996.*

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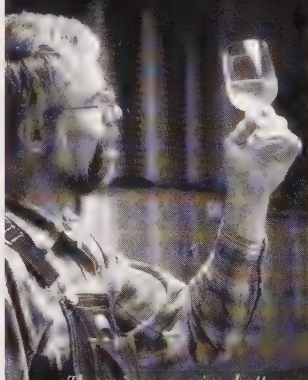

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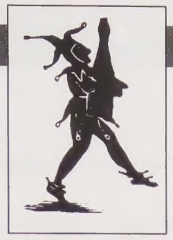

A wild hair idea

"C'mon, Iggy, what the hell would Jake Lorenzo, private eye, do at a science convention?"

"I told you, Jake," answered Dr. Iggy Calamari, "it's not a science convention at all. It's the Wild Hair Conference. Anyone with a wild hair idea can make a presentation. If the wine affirmative action plan isn't a wild hair idea, I'm not a scientist."

"It's just me blowing off steam," I say, "I haven't really figured it out yet."

"Well, son, you better get the brain waves bending, because tomorrow you'll be pitching your idea to a room full of the country's brightest wackos."

I'll tell you Jake Lorenzo's thinking on this one. I've known Iggy Calamari for more than 15 years. He's a great scientist. Not only did he invent the wine-powered pacemaker, but he's done research into all sorts of things, some wine related some not. Last year he almost killed me with a "research" eating binge in Belgium.

Years before, I got a pretty bad sunburn testing out a theory of his. Iggy figured the minute quantities of lead ingested by wine drinkers from bottles containing lead capsules would protect us from harmful ultraviolet rays. After the test, as we sat drinking, Iggy commented on my discomfort. "It's a small sacrifice you make to further science. Stop whining and pass the Pinot Noir."

The thing about Iggy is he's crazy, but lots of the crazy things he talks about happen. Iggy projected the stock market going past 11,000. He predicted the widespread success of cellular telephones. Right now, among other things, he's working on a fusion formula that converts the power of splitting atoms into fuel for space missions. There's no doubt in my mind that within a few years, space ships won't be using fuel. They'll use fusion.

So, my detective side can't really pass up an opportunity to see Iggy at the Wild Hair Conference. Jake Lorenzo's got to rub elbows with the guys who rub elbows with Dr. Iggy Calamari. I've got to see and hear for myself what the current thinking is, especially when it's the country's weirdest scientists doing the thinking.

The next day we drive to San Francisco and head to Union Square. Beneath the hip Farrallon Restaurant is an Elk's Club. The Wild Hair Convention is held in the pool, where everyone is naked. When called, the presenters wrap towels around themselves and walk to the podium. Applause is wet, sort of like seals clapping.

The Wild Hair ideas are certainly out there. Stuff like holographic projection cameras in convention sites, so three-dimensional projections would appear in various locations simulating group attendance, when in fact, all the attendees are in different cities.

Or how about rolls of Saran wrap that tear like paper towels, with no need for a cutter? One guy ran a small steam engine using the energy derived from popping kernels of corn.

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Another lady had added Viagra to irrigation water to create corn that can withstand gale force winds. It was fascinating — and a bit strange.

Iggy made an awesome presentation. His concept was rationed driving. Iggy said that traffic is slowly killing our ability to travel. Every family has two or three cars. The cars are getting bigger, unnecessarily. As Iggy put it, "SUV's in California? We need four-wheel drive and lumpy, bumpy rides to scale the two-mile-an-hour, bumper-to-bumper rush hour traffic? If people won't use common sense and use public transportation, then we've got to make private car usage less attractive."

Dr. Calamari's plan calls for rationing car drive time. Based on the same technology that allows for pre-paid phone calling cards, each person applies for and receives a designated amount of weekly drive time for his or her vehicle. A small computer chip in the vehicle is credited with that amount of time. Use it up, and the car won't start.

People would have to ration their time. No more driving down to the store for a six-pack. Better to walk and save the drive time. Soccer moms had better start car-pooling if they want to have enough time left on their cars to get to work. Take a bus to work once a week, and you'll get extra miles for that vacation you want to take.

There was a lot of debate and complaining and arguing, but Iggy had an answer for every devil's advocate. By the time he was done, I had started thinking about how I could cut back on my car usage.

I was deep in thought when, from the podium, Iggy introduced me as the next speaker. "My good friend Jake Lorenzo has a Wild Hair called Wine Affirmative Action. Please listen up to the good detective."

I'll tell you the truth. I'm not a great public speaker. But what I lack in professional ability, I make up for in passionate delivery. Basically, I told everyone that wine prices have gone beyond ridiculous. It's like every vintner is making $80 and $100 and $500 bottles of wine.

Of course, you can only buy one or two bottles, even if you have the money to afford them. It's a strange way to sell wine. Maybe if the wine was truly spectacular — year in and year out — with a long history of quality like Chateau Y'Quem, it would be worth the money and aggravation. But these are wines with little history, with no track record, and no consensus as to quality.

Prices are based on what the market will bear, not quality in the bottle. Wineries say, "If Joe is getting $80 bucks, then mine should be at least $100." Marketing people think that if the wine is less than $60 per bottle, no one will buy it.

"What about the working people?" asks Jake Lorenzo. "How much are you paying the guy who prunes those vines or picks those grapes? Can he afford to buy a bottle of your wine, this wine that he helped to make?"

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Something is very wrong, if the people working at making the wine can't afford to buy it given the money they're being paid to do the work.

Wine Affirmative Action addresses this problem. Wineries set aside 3% of their inventory for Affirmative Action. Field workers, the working poor, the unemployed, and single mothers and fathers can apply for affirmative action. Based on need, the wineries distribute their wines to the qualified recipients ... at cost. This enables a wide variety of people to drink these wines. The wineries get paid, so they don't lose money on the deal (except for the lopsided profit), and it's only on 3% of the wine production.

This allows people to drink the wine who would otherwise never have the chance. If the recipients can't handle the idea of drinking a bottle of wine, the price of which could feed their family for a week, then let them sell the bottle at full price and keep the outrageous profit for themselves.

There are many benefits to this plan. It brings new drinkers into fine wine appreciation. It gives the common man and woman a chance to taste and comment on the quality of these expensive wonders. It doesn't cost the wineries much to finance.

The Wild Hair crowd loved the idea. Jake Lorenzo was feeling pretty good, but the good Dr. Calamari brought me back down to earth. "You have a way with dreamers, Jake, it's business people who don't understand you." ■

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